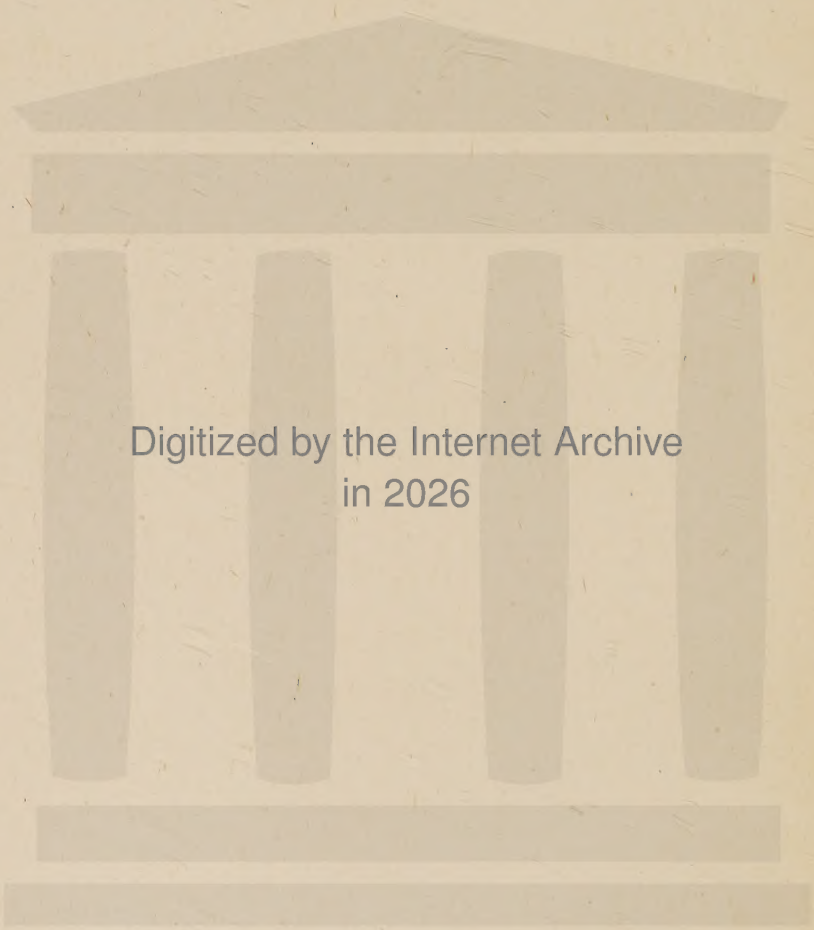

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THE HOME AND SCHOOL REFERENCE WORK

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VOLUME III

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Erie, Battle of Lake, an important naval engagement of the war of 1812 fought near the western extremity of Lake Erie, Sept. 10, 1813, between an American squadron of two large and seven small vessels, under Commodore Perry, and a British squadron of six vessels under Commodore Barclay. The *Lawrence,* flagship of Commodore Perry, on which the British fire has been concentrated, was nearly sinking when Perry transferred his flag to the *Niagara.* On the blue pennant were transcribed the words of Captain Lawrence, "Don't give up the ship." The engagement lasted four hours, ending in a complete victory for Commodore Perry. One hundred years later, the *Niagara* was raised from its resting place on the bottom of the lake.

Erie Canal, a barge canal, 387 m. long, connecting Buffalo, on Lake Erie, with Albany on the Hudson River. This canal was begun in 1817 and opened for towboats in 1825. Its depth of four feet was subsequently increased to seven; and the original investment, of $7,602,000, to $52,540,800. Plans for increasing the depth five feet having been approved, some $75,000,000 was appropriated by the State of New York in 1903, and was finished and ready for operation in 1917, at a cost of about $150,000,000, thus opening the canal to barges having a net tonnage capacity of 2000 tons each.

The Erie Canal is the longest canal in the world. It was the first great public work undertaken in the United States, and because portions of it were necessarily cut through the solid rock, but without the appliances available in our day, its completion was a national achievement that reflected special credit upon the State of New York and upon its governor, De Witt Clinton, prime mover in this great enterprise. By reducing the time required for the transportation of freight between Buffalo and Albany from 20 days to 10, and the charges from $100 to $10 per ton, the completion of the Erie Canal gave a marvelous impetus to the development of the great West and assured for New York City that commercial and financial supremacy which she has so long retained.

Erie, Lake, next to the smallest of the Great Lakes. Its waters wash Ohio, Pennsylvania and New York upon the south and the Province of Ontario upon the north. It is 250 m. long, 60 m. broad at its widest part and its area is nearly 10,000 sq. m. Lake Erie is the shallowest of the lakes and is, in consequence, subject to sudden and severe storms. It lies 564 ft. above sea level, or 330 ft. above Lake Ontario, with which it is connected by the Niagara River, with its famous falls; the Welland Canal (See WELLAND CANAL) carries lake traffic to Lake Erie, and the Erie Canal (See ERIE CANAL) connects the lake with the Hudson River. Buffalo, Erie, Toledo, Cleveland and Sandusky are the principal American ports, and Port Colborne, Port Dover, Port Stanley and Rondeau are the chief Canadian ports.

E'ris, in myths, the Greek name for the goddess of discord. See DISCORDIA.

Eritrea, *A"ri tre' a,* or **Erythrea,** *Er"yth re' a,* an Italian possession of Africa, upon the Red Sea and bordered by Egypt, Abyssinia and the Somali Coast. It is made up of a series of Italian colonies located both upon the mainland and upon islands. Physically the country is a part of the fertile Abyssinian highlands, with rich soil and healthful climate. Near the coast tropical conditions prevail. The natives practice a primitive form of agriculture and raise tobacco, cotton, vegetables and tropical fruits. Large herds of cattle are raised and the pearl fisheries are also a source of revenue. Asmara is the capital. The population numbers about 45,000, most of whom are of nomadic habits.

Ermine, *Er' min.* See WEASEL.

Ero'sion, the wearing away of the earth's surface, generally caused by rain, streams, waves, ice and wind. The acids and other chemical constituents of rain water aid in decomposing the rocks or in breaking them up into fine particles, which the water carries to lower levels; thus slopes are worn down and angular cliffs become rounded. The

channels cut by rivers and streams follow the path of the softest rocks and soils and thus are winding and irregular, especially if the stream is a slowly-moving one. Rapidly-flowing torrents often cut deep, vertical-walled valleys known as canyons (See CANYON).

On the seashore where the rock is soft, the action of the waves often carves fantastic figures and hollows out arches and caves. Upon the southern shore of Lake Superior the Pictured Rocks, rapidly being destroyed by the same power that produced them, were hollowed by the powerful waves of the lake as it was heaped up by the north winds. Not far from the region of the Pictured Rocks lie also the ancient Black Rocks, said to be among the oldest geologic formations and so hard that the waves have been unable to make any impression upon them. Glaciers rounded off summits and rough peaks by their constant motion in passing over them. The action of ice is chiefly that of breaking off rocks by freezing and thawing until cliffs are gradually crumbled away.

Erskine, *Ur' skin,* **Thomas,** LORD (1750-1823), an eminent Scottish lawyer, lord chancellor of England. His father, the tenth Earl of Buchan, was in straightened circumstances and could not gratify the son's desire for a college education. After serving for several years in the navy and in the army, spending his leisure time in wide reading, Erskine gave up his commission in 1775 and studied law. Three years later he was admitted to the bar. In his first case he delivered a speech of remarkable eloquence and ability which at once assured his success and fortune. In later cases he gave the death-blow to the doctrine of constructive treason and rendered great service to the cause of personal liberty. In many of his noted cases, including his defense of Thomas Paine for publishing the second part of *The Rights of Man,* he displayed great skill and courage. He was elected to the House of Commons in 1783, where he served until 1806, when he became lord chancellor and was elevated to the peerage. His political career, however, did not reproduce the success achieved as a forensic advocate, and he died in comparative obscurity and poverty.

Er"ysip'elas, a bacterial disease affecting the skin and immediate underlying tissues. In a large proportion of cases it affects the face and head. It causes acute inflammation, puffiness and sometimes gangrene. It is accompanied by fever, headache, nausea and sometimes delirium. The poisons occasionally wander into the joints and cause rheumatism. It is highly contagious. Iron and quinine are thought to be the best tonics to be used in a treatment of erysipelas. Nutritious and digestible foods, milk, cod-liver oil and something in the form of a stimulant should also be given.

Er"ythre'a. See ERITREA.

E"sarhad'don, King of Assyria, son and successor of Sennacherib. He came to the throne in 680 B. C. He fought against his brothers, who had killed Sennacherib, engaged in a conflict with the Chaldeans, and in 672 B. C. reduced Egypt to the condition of an Assyrian province.

E'sau, the eldest son of Isaac and Rebekah, and twin brother of Jacob. It is recorded of him that he was a skillful hunter, of a roving and restless disposition, full of animal spirits. The story of his disposal of his birthright for a mess of pottage and subsequent quarrel and reconciliation with Jacob is one of the familiar narratives of the book of *Genesis.* After the death of Isaac, Esau removed to Mt. Seir, where he became the progenitor of the Edomites.

Escanaba, *Es"ka naw' ba,* **Mich,** a city and the county seat of Delta Co., about 73 m. s.e. of Marquette and 115 m. n.e. of Green Bay, on Little Bay de Noquette, an inlet of Green Bay, Lake Michigan, and on the Chicago & North Western, the Chicago, Milwaukee & St. Paul and other railroads. With a good harbor and several large, well-equipped docks, the town is an important shipping point. Its trade is chiefly in iron ore, fish, lumber flooring, coal, furniture and

woodenware. There is an ore plant located here and also a tie-preserving plant. Water power is derived from the Escanaba River. Escanaba has a water frontage of eight miles, and the fine boating and fishing and picturesque scenery make it a popular summer resort. The town was settled in 1863, was incorporated as a village in 1883 and in the same year chartered as a city. Population in 1920, 13,103.

Esdraelon, *Es"dra e' lon,* or **Plain of Jezreel,** a plain of central Palestine, extending from Jenin on the south to the hills of Nazareth on the north, and from Gilboa on the east to Carmel on the west. It is drained by the River Kishon. In Biblical times the plain was invaded by the Canaanites, the Midianites, by the Philistines and by the Syrians, and was the great battleground of the Israelites in their repelling of the many invasions of their land.

Esdras, *Ez' dras,* **Books of,** certain books of the Apocrypha (See APOCRYPHA). They are generally divided into the *First Book of Esdras* and the *Second Book of Esdras.* The first book seems to be a compilation of narratives by various authors; the first chapter is a repetition of the last two chapters of *Second Chronicles,* with some variations of the text, and the rest of the book is a transcript of portions of *Ezra* and *Nehemiah.* The *Second Book* consists of angelic revelations and a series of visions concerning the mysteries of the moral world and the final triumph of righteousness.

Es'kimo, a race of North American Indians living on the Arctic coast of North America, from Alaska to Greenland, and on the islands to the north. A few live across Bering Strait on the Asiatic coast. The Eskimos call themselves Innuit, or "the people;" our name for the race is a corruption of an Ojibway word meaning "eaters of raw flesh."

As a people the Eskimos are generally short, although some of the men are six feet in height. They are muscular, with fat, good-humored faces that are apt to be rather flat; the hair is coarse and black and is generally either fastened in a loose knot or left hanging. Men and women dress much after the same fashion in coats and trousers made of the skins of the seal, reindeer or bear; the coat has a hood at the top, which may be drawn over the head or is used by the mother for carrying her child.

The Eskimos are not at all cleanly in their habits, and as they seldom wash, their skin is coated thickly with smoke, oil and filth. Their summer homes are tents of skin built much like tepees, while in winter they are burrowed half underground and protected at the top by walls of turf, ice and snow, stones or even bones. A basin of oil with a moss wick serves as a lamp and a stove, and the only furniture is a bench, which may be used as a table, bed or chair. Since cultivation of the soil is generally impossible, the food of the Eskimo is chiefly derived by fishing and hunting, and the seal and reindeer supply not only the greater part of their food and clothing but their other necessities and conveniences as well. Sometimes berries and roots form an agreeable change in their diet.

Much interest has recently been aroused by Stefanssen's report, in 1912, of the discovery of blond Eskimos about Victoria Land and Coronation Gulf north of Canada. Two villages were found there in which there was but one individual who had seen any people other than those of his own tribe.

Eskimo Dog, a wolflike species of dogs found in Arctic regions of Asia and North America and of great use to the natives who train them to draw their sledges and to aid them in the hunt. They are no doubt partially descended from wolves, if they are not, as some claim, merely half-civilized wolves. They are broad-chested dogs with strong shoulders, short, erect ears, a long, sharp muzzle and a straight bushy tail. The hair is woolly and exceedingly thick and warm; in color it is grayish, black, brown or white. The Eskimo dog is remarkable for its endurance; a sledge

team of five will pull a heavily-laden sledge an average of 60 m. per day, and the only care required by the dogs is that they be supplied with food of fish and meat. They are cunning hunters, but cannot learn to leave sheep or domestic animals unharmed. Since the rapid settlement of Alaska, the introduction of other breeds of dogs and the heavy work required of dogs, an Alaskan variety of Eskimo dog has appeared, somewhat less wolflike than the original of the species.

Espar'to, a valuable member of the Grass Family, growing sparingly in the United States. Its most common habitat is the Mediterranean countries, chiefly Spain and Algeria. Esparto grows in tufts or bunches from six inches to three feet in diameter, and has sage-green, hairy leaves, which when young are used for fodder for cattle. The long, flat, rushlike leaves resemble our feather grass and grow to a height of five feet, but when the plant ripens and is dried they become somewhat inflated. The plants grow in beds ten feet or more in diameter, in any sunny place where the soil is dry and sandy. It may be raised from seed, but requires 10 or 15 years to attain its growth. After a few years of growth the stem and leaves become tough and are then used for their fiber.

In Spain, on account of its lightness and toughness, esparto has long been used in the making of cordage and floating cables. It has also been employed for some time in the manufacture of matting. During comparatively recent years the French discovered that it could be used in the manufacture of paper, and now it is being employed extensively for that purpose in the United States, England and France. For this purpose it is pulled during the summer, dried in the sun and packed in bales to be exported. See PAPER.

Recently it has been acclimated to the United States, where it grows, in scattered localities, from Maine to Minnesota. Investigations are being made to discover whether the slag left after burning the vegetable matter can be used in the manufacture of glass, as esparto, like all grasses, contains a large per cent of silica.

Esperanto, *Es"pe rahn' to,* an invented language formed by Dr. L. L. Zamenhof, a Russian of Warsaw, and designed to become an international auxiliary language; it is not intended to replace any languages now in use. The words are chiefly of Latin origin but are to some extent derived from all languages. Spelling is entirely phonetic and the grammar has no exceptions to its rules. The vocabulary has about 2500 root words.

The first book of Esperanto was published in 1887 and the language is now familiar to many people. The first Esperanto society of the United States was organized at Boston in 1905, and now many local societies as well as a national association known as the Esperanto Association of North America are in operation. Already Esperanto has a large literature and many periodicals. International congresses have been held at Boulogne, Geneva, Cambridge, Dresden, Barcelona, Washington and Antwerp.

Essex, Earls of, a line of earls probably beginning with Geoffrey de Mandeville about 1139. The title passed by marriage to the Bohuns, Earls of Herford, in the 13th century and became extinct in 1373. It was afterwards held by the Duke of Gloucester, son of Edward III and husband of Eleanor de Bohun, and thereafter by his descendants, the Bourchiers, until 1540. Thomas Cromwell held the title for a short time before his execution in 1540, when it passed to William Parr through his wife, the daughter of the last Bourchier earl; and then to the famous family of Devereux, the first of whom, Walter Devereux (1541-1576), was related to the Bourchiers.

ESSEX, ROBERT DEVEREUX (1567-1601), second earl of this line, graduated at Cambridge in 1581, distinguished himself in an expedition against Holland and then took his place at court, where he became the chief favorite of Queen Elizabeth after the death of Leicester. He was loaded with honors and given com-

mand of several English expeditions. But he quarreled with the Queen; and for acting contrary to instructions as lord lieutenant of Ireland during an insurrection, and for other ill-advised conduct, he was tried for treason, his former friend Francis Bacon acting as prosecutor, and was condemned and executed.

Essex, Robert Devereux (1591-1646), third earl of this line, was the son of the preceding. He was educated at Eton and Oxford and became one of the companions of the Prince of Wales, afterward Charles I. As early as 1626 he joined the side of Parliament in its opposition to Charles, and when the Civil War broke out in 1642 he was appointed to the chief command of the Parliamentary army. As the war advanced he manifested hesitation in pushing success to the limit and in fighting against the King in person. Having also become entangled with the House of Commons over the matter of military appointments, he resigned his commission.

Es'sex, The, a famous frigate of the American navy. Under Captain Porter it went to South American waters, where it captured a convoy from the British frigate *Minerva,* and, Aug. 13, 1812, was attacked by the British sloop *Alert,* which it took after a single broadside. It then cruised for over a year in the Pacific Ocean, capturing British whaling vessels valued at more than $2,500,000, besides hundreds of seamen. In February, 1814, however, it was blockaded by the British men-of-war, *Phœbe* and *Cherub,* in the harbor of Valparaiso, South America, and in attempting to run the blockade was attacked, March 28. The battle which took place was one of the most desperate of the War of 1812 and one of the most remarkable in naval history, fully two-thirds of the Americans being killed or wounded before Captain Porter surrendered.

Esthonia. A section of country lying between the Gulf of Finland and Latvia, and Russia and the Baltic Sea. It includes the old Russian province of Esthonia and northern Livonia. It is the country of the Esths, a Finno-Ugrian people, closely akin to the Finns whom they resemble in language, and mental and physical traits. Their present location suggests that they have been forced out of more favored sections in Russia. Their country was long ruled by the German religious order of the Brothers of the Sword, as a consequence a large part of the land is in the possession of German families, and old Esthonia was known as one of the German provinces of Russia. Owing to its strategical location, various Scandinavian countries contended for its possession.

Esthonia passed finally under the control of Russia by the Treaty of Nassau in 1721. It remained a Russian province until the close of the World War. But the Esthonians are not a Slavic people, and when the Russian government was overthrown in 1917 Esthonia declared its independence. Area estimated about 10,000 sq. mi.

See Brest-Litovsk.

Estate, originally the legal term for one's common law interest in his land, but now extended to include all the property which one leaves to be divided at his death. Common-law estates are divided into two classes, free-hold estates and estates of less than free hold. A free-hold estate in fee simple may be disposed of by the owner at will. If held in fee-tail, it is limited to certain heirs and cannot be disposed of by the possessor except by the consent of these heirs. In the United States fee-tails are generally abolished. See Entail.

Esther, *Es' ter,* a book of the Old Testament which contains an episode in the history of those Israelites who remained in captivity after the return of their countrymen to Jerusalem. The scene of the narrative is the royal city of Susa; the events occur in the reign of Ahasuerus, King of Persia, 485-465 B. C. The courage and loyalty of Queen Esther is the theme of this, one of the many charming narratives of Hebrew literature. The book is written in Hebrew, though additions in Greek have been made. The authorship, which is

unknown, has been attributed to Mordecai, kinsman of Esther, and to Ezra. See BIBLE, subhead *The Old Testament.*

Es'tuary, the enlarged channel at the mouth of a river, or an arm of the sea narrowing inwards at a river's mouth in which there is considerable tidal disturbance. An estuary is usually formed by the submergence of the land at the mouth of a stream, which is further worn away by erosive action of the tides and waves. Estuaries are usually obstructed by shifting bars which interfere with navigation. At high tide the force of the waves causes the sand and mud brought down by the river to be deposited some distance from the sea; while at ebb tide a large part of this deposit is carried out to form a bar some distance beyond. Considerable turbidity of the waters is the result of this oscillation. In some estuaries the tides move rapidly against the current of the stream, causing what is known as a "bore," a phenomenon common in the Bay of Fundy.

Etch'ing, the process of engraving metal plates by means of an acid. A clean plate is covered with a composition of Egyptian asphaltum, virgin wax and Burgundian pitch, known as an etching ground, which protects the surface during the action of the acid. The figure or design is cut through this covering with tools called etching needles; afterwards the plate is placed in a weak solution of nitric acid, which eats or bites the figure in the plate. Etching is often combined with engraving to produce fine effects. See ENGRAVING; ZINC ETCHING.

Ete'sian Winds, the north and northeast winds which blow over southern Europe during the summer season. They are thought to be the indraught due to the rising of the heated air over the Desert of Sahara. These winds are strongest in July and August.

E'ther, or Sulphu'ric Ether, a light, easily evaporated liquid composed of carbon, hydrogen and oxygen. It is highly inflammable and colorless and has a sweetish taste and odor. It is medically valuable as an anæsthetic and in the United States is more generally used than chloroform. It is estimated that there is an average of only one death in 16,000 cases, due to its use. Ether is also used in medicines whose object is to dissolve fats or resins, since ether is a powerful solvent of such compounds.

Eth'ics (from Greek *ethikos,* pertaining to conduct or character), the science of human conduct. There are also other sciences, however, that deal with conduct: anthropology, ethnology, psychology, political economy, sociology. But these *describe* human activities; ethics *judges them.* Ethics is therefore the science that treats of conduct with reference to its moral qualities, whether it is right or wrong, good or bad. Moreover, if we define ethics as a *science* the term should be understood in a sense broad enough to include the philosophical basis and the practical issues involved. That is, ethics is not exclusively a science, but partly also a philosophy and an art.

What are the motives that impel men to action? Why does a man choose this object of endeavor rather than that? What are the ends that men seek in life? These questions place before ethics a part of its task, the scientific investigation and analysis of the motives that actually form the springs of action. Without this, ethics is in danger of losing itself in profitless *a priori* speculations. But more than this is involved also. Can we determine among these motives, or from any source, what end is right or best for men to seek, what is the highest good, the *summum bonum* of life? Thoughtful men have asked this question in all ages. It involves more than purely scientific problems, and includes philosophical and religious consideration of permanent moral values.

There are, and have been since the days of the Greeks, two main theories of what constitutes the highest good. One is known as *hedonism.* It makes *pleasure* or *happiness* the highest good. Not necessarily the pleasure of the senses, or the pleasure of today, however; it may emphasize also the higher forms of pleasure and may even advocate present sacrifice for the sake of future happi-

ness. Nor is the theory limited exclusively to individualistic pleasure; in modern times it has been extended to include the greatest happiness of the greatest number, the ethical theory known as utilitarianism.

The other main theory is that the highest good is found in *virtue* or *perfection,* and its advocates are known as Perfectionists. They claim that hedonism is wrong in calling pleasure the motive of action; that pleasure is at best no more than the result of right action; that a man does not eat his dinner, for instance, because there is pleasure in doing so, but for other reasons, and pleasure is only incidental; that great numbers of men, as a matter of fact, are living their lives without making pleasure their chief aim. The highest good is, rather, in the achievement of that development and self-realization, for the individual and the community, the possibilities of which are inherent in their constitution and nature. Just what is the content of the highest good may not be known in full from the beginning, but is discovered more and more in the process of historical evolution. This ethical theory has assumed many special forms in the course of history, and has regarded the highest good as determined in various ways: by the law of God, by the requirements of human reason, by the ultimate constitution of things, by the fundamental human needs or wants existing in individual and community life, by the growing ideals of humanity from age to age.

In addition to the problem of motives and the nature of the *summum bonum,* there arises the other question, Why should a man seek the highest good at all? Ethics includes, therefore, a consideration of the problems connected with right and wrong, obligation, conscience. The most satisfactory conception with reference to this aspect of ethics seems to be that the feeling of obligation is not forced from without, but is a constituent element of reason itself. The nature of the mind is such that the very perception of the highest good carries with it a sense of obligation that this end *ought* to be actualized in life. Conscience is not some separate faculty, or sixth sense, but is the reason of man dealing with questions of moral ends and their attainment. The ideals of the highest good may change from age to age with growing knowledge, but conscience is the "categorical imperative," requiring us to seek that end which reason has approved as best.

The study of ethics also leads out into consideration of the institutions of society, such as the family, business activities, the school, the Church, the State, in which conduct finds its concrete significance and ripens into character; and where the individual secures that freedom and self-realization which come only through the fulfillment of his function in the midst of his environment. See CYRENAICS; CYNICS; EPICUREANISM; STOICISM; HEDONISM; UTILITARIANISM; PHILOSOPHY; ÆSTHETICS.

E″thio′pia, the ancient name for the region south of Egypt now included in Nubia, Abyssinia, Kordofan and Sennar. In the Bible it is spoken of as the Land of Cush. At one time it must have been a powerful country, with Meroë, a city whose ruins are still to be seen on the Nile, as its capital. The language is a Semitic form still used in the Abyssinian Church. The kings of Ethiopia frequently ruled over Egypt, but Egypt never gained control of Ethiopia. Abyssinia is now frequently called Ethiopia.

Ethnog′raphy, the science which deals with the distribution over the earth of races and peoples. It is a branch of anthropology and is closely related to ethnology. It deals specifically with the scientific division of men into races and nations. See ANTHROPOLOGY; ETHNOLOGY.

Ethnol′ogy, that branch of anthropology whose unit of study is mankind. It treats of man's development intellectually through different stages; his religion, customs, government, trade and commercial organization, art and language. It takes up the study of man at the stage where anthropological investi-

gation ends. See ANTHROPOLOGY; ETHNOGRAPHY.

Et'na, or **Ætna,** the largest volcano in Europe. It is in northern Sicily, close by the city of Catania. It rises abruptly from the sea to a height of 10,755 ft., and has a circumference of 100 m. at the base. The top is capped with snow summer and winter; halfway down the side the mountain is densely wooded; and at the base are vineyards and orchards. Several small towns are dotted about over the lower slopes. A traveler passing from the base to the summit journeys through several climates—at the base the warmth of the Sicilian plain, midway to the top climate corresponding to that of the Northern countries and at the top perpetual winter. From the summit a wonderful view is obtained, embracing all of Sicily and a large part of lower Italy, the Lipari Islands and Malta. Many destructive eruptions from Etna have occurred at various times. In the 12th century 1500 lives were lost and almost as many again in 1669. In 1693 the eruption and the accompanying earthquake destroyed 60,000 lives. Other disastrous eruptions took place in 1755, 1832, 1865, 1874, 1879, 1906 and 1907; and in 1911 occurred an eruption more violent than any of recent times, which brought serious damage to the adjacent country.

E'ton College, at Eton, England (1440). It was founded by Henry VI in the little village on the Thames facing Windsor and was first called "The College of the Blessed Mary at Eton beside Windsor." It was originally a school for the poor but is now a popular school for the nobility. Students are entered between the ages of 12 and 14 years, and the work is largely preparatory in character. Although the school is now housed in well-equipped buildings, one of the original buildings, begun in 1441, is still in use.

Etru'ria, an ancient Italian country occupying what is now included in the provinces of Latium and Tuscany. Its ancient inhabitants are known as Etruscans. Physically, it was bounded by the Tiber and the Apennines, while it stretched to the Mediterranean on the west. It was already inhabited and in a high state of civilization at the time of the founding of Rome. Under the Tarquins, Rome became mistress of Etruria, but later the Tarquins were expelled and the Etruscans, under Lars Porsena of Clusium, endeavored to establish themselves in Rome. The defeat of the Etruscans in the Battle of Lake Regillus and the treaty with Carthage were among the last notable events of Etruria's days of power. In 309 B. C. Etruria became wholly Roman, although for nearly two centuries her cities excelled Rome in culture and in prosperity.

Etrus'cans. See ETRURIA.

Eubœa, *U be' a,* an island of Greece, the largest in the group lying in the Ægean Sea. Its length is 98 m. and it has an average width of 30 m. The highest summit of the mountains which traverse it is Mt. Delphi, extending to a height of about 5725 ft. Grain, figs, wine and oil are the chief products of the fertile soil. The island was once the source of the grain supply of ancient Athens, and its honey still remains of excellent quality. Chalcis, Eretria and Carystus are the principal towns. The Abantes and Dryopes were the earliest inhabitants, and after the settlement of the island by the Ionians, about 1100 B. C., it rose rapidly in importance and soon became a center of learning and the seat of the Eubœan School of Philosophy. After the Persian Wars it was in the possession of Athens, became independent after the Peloponnesian War, and was in the possession of the Turks from 1470 until the Greek Revolution. Since 1830 it has formed a part of the new Greek state. Population, about 59,000.

Eucalyptus, *U"ka lip' tus,* a large class of splendid trees belonging to the Myrtle Family and native in Australia. They have tall, slender trunks and branches which tend to a vertical rather than a horizontal position. The leaves are long and pointed, generally growing in pairs upon the stem and always covered with small, resinous spots. The

flowers grow in almost stemless clusters in the axils of the leaves. These trees are chiefly remarkable for their great size, as some attain to a height of nearly 500 ft. These tallest species are gum trees and are known as the blue gums; they are grown in California and the Gulf States and produce an oil which is used medicinally. Recently it has been found that this oil is an effective deodorizer, disinfectant and antiseptic, and, with the increased use of these, the production of oil of eucalyptus has increased in importance as an industry. Eucalyptus wood is light and durable and is used in shipbuilding and for various other purposes.

Euchre, *U' ker,* a game of cards for two or more persons, in which 24 or 32 cards are used, all spot cards below the 7 or the 9 being thrown out. The cards are dealt, two to each and then three to each, or vice versa, and the dealer then turns the top card face-up on the pack which remains. If but two are playing, and the nondealer holds cards which will probably take three tricks, he orders the dealer to take up the *trump.* If not, he *passes;* and then the dealer either takes up the trump and discards his least valuable card, or turns the trump down. Each, in turn, then has an opportunity to make either of the other three suits trump. The one who *orders up,* or *takes up* the trump, or the one who *makes* it must lead. If he wins either three or four tricks, he scores one; if he wins five, two; otherwise he is *euchred,* and his opponent scores two upon taking three tricks. The game is five points, or ten if so agreed.

In the trump suit, the jack, or *right bower,* is high; then the jack of the same color, or *left bower,* the ace, king, etc., in order, but in other suits the ace is the highest card. In every trick each must follow suit if possible. Any trump, however, will take any card of another suit. When neither will make the trump, the deal goes to the opposing player. When three or more play single-handed, each may agree to help the others against the maker of the trump. The game is then known as *cut-throat euchre;* and, if together they win three tricks, each scores two. To complicate the game, a single card known as the *joker,* and the highest card in the pack, is sometimes introduced. Four-handed euchre is generally played by partners, either of whom may *play alone* in a given hand if he so elects. Should he win five tricks, a march, he scores four.

Euclid, *U' klid,* of Alexandria, a Greek mathematician living about 300 B. C. Because of his work in geometry, that branch of mathematics is still frequently called Euclid. His works include 13 books on geometry and several less important treatises on mathematical subjects.

Eudiometer, *U"di om' e ter,* a graduated glass tube bent like the letter U, in which is introduced wires for producing electric sparks. The instrument is used for analyzing gaseous mixtures and determining their purity, and for this purpose electricity is often employed.

Eugène, *U"zhen',* **François** (1663-1736), a famous general, commonly known as Prince Eugène of Savoy. He was born in Paris. His own desire for a military career prevailed over the plan of his family, that he enter the Church. Because of his mother's banishment from court, by Louis XIV, and his failure to obtain a commission in the latter's army, Eugène entered the service of Leopold of Austria, having acquired a hatred of the King of France that time never cooled. He first fought against the Turks, later took an active part in the war of the Coalition against Louis, and in 1691 became commander of the imperial army in Piedmont. About this time Louis tried to secure him for service, by heavy bribes which he scorned to accept. In 1697 he defeated the Turks in Hungary in the famous Battle of Zenta. In 1701, at the outbreak of the War of the Spanish Succession, Eugène was put in command of the army in Italy, and later was transferred to Germany. With Marlborough he won the brilliant victory over the French and Bavarians, at Blenheim, Aug. 13, 1704.

In 1706 he expelled the French from Italy; at Oudenarde, in 1708, and at Malplaquet, in 1709, he shared in the triumphs of Marlborough. After the close of the War of the Spanish Succession, Eugène again bore a prominent part in the war against the Turks, renewed in 1716. In his later years he was a patron of art and literature.

Eugene, *U jeen'*, **Ore.,** a city and the county seat of Lane Co., 124 m. s.w. of Portland, on the Willamette River and on the Southern Pacific and other railroads. It is the commercial focus of the fertile farming district comprising the Upper Willamette Valley, a region famed for its timber and mineral wealth (gold and silver). In the city are numerous industrial plants, including saw and planing mills, canneries, flour mills, sash, door and blind factories, tanneries, machine shops and ironworks, excelsior factories and brickyards. Eugene is the seat of the Oregon State University, opened in 1876. Settled in 1854, the place was incorporated ten years later; it is at present administered under a charter of 1893. Population in 1920, 10,593.

Eugenics, *U jen' iks,* the science of race improvement, whether of plants, lower animals or human beings. In recent years the term has been used more especially in the latter sense; Sir Francis Galton, who first thus made use of the expression, defines it as the "study of agencies under social control that may improve or impair the racial qualities of the future generations either mentally or physically." The fact that there are so many feeble-minded, insane, blind, deaf or otherwise subnormal children born into the world has led to the scientific study of the causes and an effort to remove them. To assist in this, Galton has made a gift of $250,000 to the University of London for the establishment of a chair of eugenics. At the same time the subject excited attention in America and the American Breeders' Association appointed a Eugenics Committee, whose chairman was Dr. David Starr Jordan. The duties of the committee are the collection of data upon the subject of race improvement, research work for the purpose of enlarging knowledge of the subject and, lastly, the disseminating of the facts learned. This committee has already established a record office, and in London a magazine of eugenics is being published.

At present the practical value of the study cannot be determined. The work is philanthropic in that it aims at the betterment of all classes; it favors legislative restrictions of the marriage of those physically unfit. Among the most readable books on the subject may be mentioned J. A. Thompson, *Heredity;* Jordan, *The Heredity of Richard Roe;* Galton, *Studies in National Eugenics;* Pearsons, *National Life from the Standpoint of Eugenics;* Saleeby, *Parenthood and Race Culture;* Burbank, *The Training of the Human Plant.*

Eugénie-Marie, *U"zha"ne'-Mah ree',* **de Montijo** (1826-1920), formerly Empress of the French as wife of Napoleon III. She was born at Granada, in Spain, the second daughter of the Count of Montijo. She possessed great personal charm and beauty, and married Louis Napoleon in 1853, soon after he was proclaimed emperor. Several times she acted as regent in the absence of the Emperor. When the war broke out with Germany (1870), she was again appointed to this position, but was forced to flee to England, where she was joined by her son and later by her husband. The Emperor died in 1873, and her son was killed in 1879 while serving as a volunteer in the Zulu War. The following year she visited the spot and brought the body back to be buried by the side of his father. She continued to live in retirement in England, interested in passing events, but taking no part in French politics.

Euphorbia, *U for' bi a.* See SPURGE FAMILY.

Euphrates, *U fra' teez,* the great river of Mesopotamia, forming with its tributary, the Tigris, the chief river system in the western part of the continent. Two branches are its source in Armenia: the Kara Su, or Western Euphrates, rising

northeast of Erzerum and flowing southwest until it is joined by the Murad Su; the Eastern Euphrates, coming from the slope of Ala-Dagh, and joining the Kara Su below Seraijik. Its course is then among the Anti-Taurus Mountains for about 45 m., and it later flows in an uninterrupted course of 1200 m. to the Mediterranean Sea. Along its way it separates Mesopotamia from Syria and the Syrian Arabian deserts, and at Kurna it is joined by the Tigris River. Its total length is more than 1700 m., and the estimated area of its basin is 260,000 sq. m. Commercially, the river has slight importance, for scarcely more than 450 m. are continuously navigable, owing to the shallowness of its water. Historically, on the other hand, the Euphrates has been foremost among the rivers of the world. The early history of the old Oriental world empires connects closely with the river, for it was then a scene of crude but significant means of commerce and travel. The allusions in *Jeremiah* and writings of other prophets reveal the attitude of the Hebrews to the river, which in their dreams represented the limit of their territory. It was one of the four rivers of Eden, and is referred to in the Bible as "the Great River," or "the River."

Eure'ka, Cal., a city and the county seat of Humboldt Co., 225 m. n.w. of San Francisco, on Humboldt Bay and on the California Western, the San Francisco & North Western and other railroads. There is a fine harbor and connection with Pacific-coast ports by regular steamship lines. The city is in the famous redwood region, and an extensive trade in redwood lumber is carried on. Other important articles of commerce are shingles, wool, apples, butter and fish. In the city are numerous lumber mills, an iron foundry, a tannery, a woolen mill and other industrial plants. There is a fine courthouse, also a Carnegie public library. In the vicinity is Sequoia Park, a redwood forest 40 acres in extent. Settled in 1850, Eureka was incorporated in 1856. Population in 1920, 12,193.

Euripides, *U rip' i deez,* (about 480-406 B. C.), a Greek dramatic poet, born probably at Salamis. He received a liberal education, was trained to become an athlete, essayed painting and finally, at the age of 25, produced his first play, the *Peliades,* and was recognized as a tragic poet. Several times during his life he competed for the first prize—he won the distinction only five times—but he was never wholly popular, and was eclipsed by Sophocles and Aristophanes, who conformed entirely to the traditions of the old school.

In the representation of human passion, lay his greatest strength. He places the struggle within the soul of man himself, instead of making it a conflict between man and laws divine; in this respect he touches closely upon modern, especially the romantic, tragedy, of which he was the precursor. In style his works are admirable and have been deemed worthy of imitation; in plot they are weak and defective, for he often presents detached episodes without any pretense of securing unity. His prologues are invariably heavy and mechanical. He attempted to mold his tragedies to suit an age that was witnessing the undermining of the popular religion and a questioning of the belief in the gods and heroes of old. And the power and insight he manifested in this transitional age caused him to be ranked as one of the great tragic poets that Greece has produced. He wrote at least 75 pieces, of which a great number have been lost. His works embrace *Alcestis, Andromache, Hecuba, Electra, Hercules Furens, Medea, Hippolytus, Bacchæ, Iphigenia Among the Taurians, Orestes, Troades* and *Phœnissæ.*

Euro'pa, in Greek mythology, a daughter of Agenor, King of Phœnicia, and a sister of Cadmus. According to legend, Jupiter, attracted by her beauty, assumed the form of a white bull and carried her on his back to Crete, where he resumed his human semblance and won her love. She bore him Minos, Sarpedon and Rhadamanthus. Jupiter made her presents of the bronze man, Talos, a dog which never lost its prey and a spear

which never missed its mark. Europa subsequently became the bride of King Asterius of Crete, who adopted her sons.

Europe, the smallest of the grand divisions. It forms a part of the Continent of Eurasia, from which it projects to the northwest as a huge peninsula. It is in the Eastern Hemisphere and lies between 71° 11′ and 36° north latitude and between 9° 28′ west and 66° 20′ east longitude. The Strait of Gibraltar and the strait between Sicily and Tunis separate it from Africa on the south.

Size. From north to south, from Cape North to Cape Matapan, its greatest extent is 2400 m.; from east to west, from Cape St. Vincent to Ekaterinburg, 3400 m. The total area of the mainland and adjoining islands, including Iceland, Nova Zembla and Spitzbergen, is about 3,850,000 sq. m. Europe is peninsular in form, surrounded on three sides by the ocean or sea—the Arctic on the north, the Atlantic on the west and the Mediterranean Sea on the south. The coast line is very irregular. Its length is estimated at 20,000 m., if only the large indentations are included; the entire shore line measures about twice that length. Although the size of Europe as a whole is comparatively small, its historical and political significance is unparalleled among the grand divisions of the globe.

Coast Waters. On the north is the White Sea; on the west, the North Sea, Gulf of Bothnia, Baltic Sea, Gulf of Finland, Gulf of Riga, English Channel, Strait of Dover and the Bay of Biscay; on the south, the Strait of Gibraltar, Gulf of Lyons, Gulf of Genoa, Adriatic Sea, Ægean Sea, the Dardanelles, Sea of Marmora, the Bosporus, Black Sea and Sea of Azov; on the east, the Caspian Sea. The Ural and Caucasian mountains, together with the Black and Caspian seas, form the boundary between Europe and Asia. Several important peninsulas extend into these waters. The Scandinavian Peninsula in the north is the largest in Europe. Here also is the Peninsula of Jutland. The three large peninsulas in the south are the Iberian, the Italian and the Balkan. The shores washed by the coast waters are widely different, varying from the rock-bound and fiord coasts of Scotland and Norway and the steep coasts of the Mediterranean to the sandy lowlands of Netherlands and Belgium.

Adjacent Islands. The islands and peninsulas of Europe form about half its continental area. Both the Atlantic Ocean and the Mediterranean Sea contain numerous and important islands. In the northern seas are Iceland, Nova Zembla, Zealand, Åland, Gothland, Ösel, Dagö, Spitzbergen, Franz Josef Land, Bear Island, Jan Mayen, and, more important, the British Isles and the Shetland and Orkney islands. The Mediterranean group includes the Balearic Isles, Sicily, Corsica, Crete, Sardinia, Cyprus and minor groups and isles. Surrounding the islands and between them and the Continent the sea is shallow, not exceeding 700 ft. in depth. Many of the islands are extensions of the mountain ranges of the Continent.

Physical Features. The topography of Europe is comparatively simple. The lowlands embrace fully two-thirds of the land mass and form a continuation of the great Asiatic plain.

Highlands. There is one extensive mountain range in the south, and a secondary system in the north. The smaller one occupies a large portion of Scandinavia, the northwestern part of Scotland, the west of Great Britain and sections of Ireland and France. These mountain ranges are low and comparatively short, often consisting merely of single mountains or plateaus. The Scandinavian system is the highest; in Germany and France are the Jura, Vosges, Bohemian Forest, Harz, Black Forest, Erzegebirge, Thuringian Forest and Riesengebirge. The Ural mountain range is in the eastern part of Europe. It has no connection with the western elevations, but is the longest mountain range of the Continent. The southern high zone is a continuation of the immense range which traverses the south-central part of Asia. It breaks into Europe through the Caucasian mountain range, and soon forms

the Alpine system. The Alps proper constitute the loftiest feature of the mass; to them are joined the Carpathian, Balkan and Apennine mountains. To the west of this group, and practically separated from it, are the Pyrenees and the Sierra Nevada of southern Spain. The Alpine system, due to its frequent passes, forms no great impediment to commerce, despite the fact that it is the highest point in Europe. Vesuvius is the only active volcano of the Continent. The islands contain others, such as Etna in Sicily and Skaptar Jökull and Hekla in Iceland.

Lowlands. Between these two highlands lies the "great plain" of Europe. This area begins at the foot of the Ural Mountains, stretches out widely over Russia, extending to the Arctic and the Baltic seas, and continues along the shores of the North Sea and English Channel, through northern Germany and France to the Pyrenees. There are also fairly extensive lowlands enclosed by the mountains. Such are the plains of Switzerland, between the Jura and the Alps, and the river valleys of the Danube, Po, Saône, Rhône and other streams.

Rivers and Lakes. The European watershed extends from southwest to northeast, from the central Ural Mountains through the Carpathians and the Alps to the Iberian Peninsula. The principal rivers descend from the Alps proper. Among the rivers of Russia which flow to the south are the Ural, Volga, Don, Dnieper and Dniester; those emptying into the northern seas are the Dvina, Düna and Petchora. In western Europe the continental area, the British Isles, the northern and the three southern peninsulas have their own river systems. The Oder and the Vistula flow into the Baltic Sea; the Rhine, the Elbe and the Thames into the North Sea; the Seine into the English Channel; the Loire, the Guadalquivir, the Tagus and the Guadiana into the Atlantic Ocean; the Ebro, the Rhône and the Po into the Mediterranean Sea; and the Danube into the Black Sea.

There are two principal lake areas of Europe, the southern and the northern. The former, centering around the Alps, embraces sheets of water celebrated for the beauty of their surrounding scenery. Here are found lakes Como, Lugano, Maggiore, Iseo, Geneva, Zürich, Garda, Constance, Lucerne, Ammer and many others. The largest salt-water lake in existence is the Caspian Sea, between Europe and Asia. Russia contains lakes Onega and Ladoga, the most extensive of European fresh-water lakes. In Finland, Sweden, Norway and the British Isles are numerous lakes, many of them formed by ancient glaciers.

GEOLOGY. One of the most interesting episodes in the geologic history of Europe was the advance from time to time of ice sheets from the highlands of Scandinavia. Smaller ice sheets also descended from the mountains of the southern part, and settled over the intervening plains. Deposits of moraine, like clay or shingle, remained over vast regions when the ice disappeared. Also numerous lakes were scoured out and the course of streams was greatly modified.

The minerals of Europe are varied and abundant. Iron ores are richly distributed, especially in Great Britain, Germany, France, Belgium, Norway and Sweden. Italy has iron ores, but no coal. Likewise in Russia the iron is far removed, even by rail, from the main sources of coal. The most advantageous combination of iron and coal deposits belongs to England, and to this reason can be traced in large part her industrial supremacy. South Italy and Sicily supply the bulk of all the sulphur used in the industries; Russia, most of the platinum; Spain and Portugal (among European countries), the greatest amount of copper; Spain, the most quicksilver and (next to the United States) the largest amount of lead. Large tin mines are found in England. In the Scandinavian Peninsula are found superior steel-making and rich silver ores. Silver and gold are produced in paying quantities throughout different parts of the Conti-

nent. Salt, granite, limestone and clay deposits are also found.

Climate. Lying principally within the temperate and wholly outside the tropical zone, Europe enjoys a fairly equable climate. Other influences contribute to producing and maintaining this mild temperature. The prevailing winds from the Atlantic are warm, and they have free access to the greater part of the western half of the Continent. The Gulf Stream affects the temperature to a great extent (See Gulf Stream). The average elevation of the land is lower than that of any other grand division, save Australia; the result is the absence of extremes of temperature. An extensive coast line represents another influence. The rainfall is well distributed, diminishing, however, as the distance from the Atlantic increases. The eastern part of Europe has a continental, rather than a sea climate, the summer temperature increasing and the rainfall diminishing at a sufficient rate to produce steppes but never deserts. The Alps have an ameliorating influence on the north winds in the southern part of Europe, and the climate becomes very uniform, while the summers are often dry.

Plant Life. Three rather indistinct regions of the flora of Europe can be distinguished. The first, lying in part within the Arctic Circle, consists mainly of the Russian tundras, and grows lichen, moss, poppy, saxifrage, crowfoot and other showy flowers, as well as willows, beeches and junipers that become stunted in their growth because of being buried under winter snows at long intervals. The highest elevations of the mountains of Europe present a flora somewhat similar to that of the high latitudes of the north. In the temperate region forests are numerous in the west, and the plant life is in no wise unique in respect of wealth or type; in the eastern part the forest areas yield to the extensive steppes, or treeless plains, scattered with shrubs and covered thinly with long, coarse grass. The Mediterranean region is essentially the fruit and flower area. The flora is rich and attractive; the forests contain a large number of species; among the fruits the orange, lemon and olive are found; of the foliage used for decorative purposes, the laurel and the myrtle are most abundant.

Animal Life. The climatic conditions and the luxuriant vegetation have given rise to a richness of European fauna; on the other hand, in the densely populated areas, native species have been crowded out, even to the point of becoming wholly extinct. Mammals, peculiar to the region in which they are found, are the chamois and the marmot (in the Alpine mountain region), the wolf (in large packs in Poland, Hungary and Russia), the lynx, brown bear, beaver, reindeer, elk, Grecian ibex, the civet and the desman. The large herds of cattle formerly seen have practically become extinct. Bird life is abundant, and many of the species migrate from the south; of the numerous insects, the butterfly and beetle in particular are distinguished because of their numbers. Few reptiles are found; frogs of unique species exist, as well as newts and tree toads. Among the fish, the tunny and sole are the ones which are unknown on the American side of the Atlantic. The northern seas have cod, mackerel, herring, salmon and other varieties.

Inhabitants. Among the inhabitants of Europe are those belonging to the Celtic, the Teutonic and the Slavonic races and the Greek and Latin peoples. These are all a part of the Aryan, or Indo-European, branch. In addition are immigrants of Mongolian stock, such as Hungarians, Turks, Finns and Lapps. The Celtic language is spoken in the Scotch Highlands, Wales, Ireland and Brittany. The Teutonic race includes the Germanic branch (Germans, Dutch and English) and the Scandinavian branch (Danes, Swedes and Norwegians). The Slavonians are the Russians, Bohemians, Poles, Croatians and Servians. The Basques, living in France and Spain at the western extremity of the Pyrenees, are still of unknown origin. The religions represented are the Roman Cath-

olic Church, the Greek Church, the Protestant, the Jewish and the Mohammedan. The total population of Europe is about 449,883,542.

Political Divisions. The independent states of Europe are either strictly limited constitutional kingdoms or republics of various degrees. The free cities of medieval times are represented, even the shires of tribal days are seen in the still surviving tiny republics.

History. The history of Europe traces back to prehistoric times and embraces the history of civilization itself. Centuries before the dawn of history, Europe was the home of numberless tribes belonging to different branches of Aryan race; though widely scattered ethnic islands of non-Aryan people—Basques and Lapps—indicate an earlier time of which we have no certain knowledge.

The classical history of Europe is that of Greece and Rome which, facing Egypt and the Euphrates Valley, caught the sunlight of their culture and spread it to lands and people subject to their sway, thus that section of Europe that formed a part of the Roman Empire experienced the blessings of organized government, Christianity, and the culture of Greece and Rome.

That period terminated when a tidal wave of invading people still organized in tribal society rolled in on the Western Roman Empire and overthrew it. Not being able to assimilate at once the culture of the classical period they initiated the so-called Dark Age of European History. During the centuries of this era we witness the outlines of the great nations of Medieval and Modern times taking shape.

The modern history of Europe covers the time from the passing of the Dark Age to the World War of 1914. This period witnessed the solidification, so to speak, of the greater nations of Europe and the overthrow of the half-fictitious Holy Roman Empire founded by Charlemagne, and finally the union into one really great empire of the many small Germanic states of Central Europe. It was an age of great intellectual and scientific advance, of capitalism, of individualism and growth of race consciousness The age of industrialism. But here and there outbreaks,—much as the French Revolution and the revolutionary uprising of the 19th century, testified to deep seated unrest of the masses of the people, not yet recovered the full measure of primitive liberty.

The World War of 1914 was the most momentous occurrence in the history of Europe. Autocratic government has disappeared from Europe. Austria-Hungary has disintegrated into the ethnic elements composing it. There has been a new grouping of Balkan powers and Roumania and Serbia take their place among the potentially great states of Europe. Turkey is no longer a European power. A nation entirely new to history (Czecho-Slovakia) has made its appearance, other new nations are trembling on the rise. Finland has resumed its independence and Poland, phoenix like, is once more a nation with territory as great as it possessed before its first partition. France and Italy have gained in territory in Europe; but Germany has suffered the loss of one-sixth of her territory in Europe and all her foreign colonies. But Europe now faces possible changes in social life as momentous as those through which the nations of Europe struggled in changing from tribal to political society.

Eurydice, *U rid' i se,* in Greek myths, wife of Orpheus. See Orpheus.

Euse'bius Pam'phili (about 264-about 340), a famous writer of Church history, born in Palestine. He cared for his friend Pamphilus, Bishop of Cæsarea, during the two years of his imprisonment under the persecution of Diocletian, and then went to Tyre and later into Egypt, where he was imprisoned on account of his religion. He was made Bishop of Cæsarea in 313 and continued in this position until his death. He is particularly conspicuous for his *Ecclesiastical History* in ten books, and for his connection with the Arian controversy and the Council of Nice. (See Nicene Creed.)

Eu'stis, James Biddle (1834-1899), an American jurist and statesman, born in New Orleans. He graduated in law at Harvard in 1854 and practiced in New Orleans until the outbreak of the Civil War, when he entered the Confederate army as judge-advocate, serving until the close of the war. He was a senator in his own state from 1874 to 1876, and was twice sent to the United States Senate, serving from 1877 to 1879 and from 1885 to 1891. Eustis was also professor of law in the University of Louisiana and, later, minister to France.

Eu'taw Springs, Battle of, an important battle of the American Revolution, fought Sept. 8, 1781, about 50 m. north of Charleston, S. C., between 2000 Americans under Greene and about an equal number of British under Stuart. The engagement opened at 4 a. m. and for a time the Americans had the advantage. Later in the day the British took possession of the field, which they continued to hold. Strategically, however, the Americans won a victory, for on the following night the enemy retreated to Charleston. This battled ended Greene's remarkable Southern campaign, by which he forced the English to retire to Charleston, where they were confined until the close of the war.

Euter'pe, musical Muse of lyric poetry, to whom is credited the invention of the flute. She usually appears as flower-crowned and surrounded with musical instruments.

Eux'ine. See BLACK SEA.

Evangel'ical Alli'ance, an association of the members of various Protestant denominations throughout the United States and Europe. It was organized in London in 1846 for the purpose of securing united effort among the Christian churches in the extension of the Christian faith. The denominations included are the Baptist, Independent, Lutheran, Methodist, Moravian, Presbyterian, Reformed and a few others. England, France, Germany, Ireland, Scotland, Switzerland, Sweden and the United States are among the countries represented, and there are branches in many of the British colonies. International conferences are held at intervals from two to four years. This organization represents the present tendency of the various branches of the Christian Church to unite on practical forms of religious work, and it has done valuable service in promoting religious liberty and checking religious persecution.

Evangelical Association, a religious denomination formed originally among the Pennsylvania Germans. The founder of the sect, Jacob Albright, moved by the low religious life of the people about him, began evangelistic work among them about 1790. In 1807 a definite organization took place. In doctrine, methods of worship and government, the Evangelical Association closely resembles the Methodist Episcopal Church (See METHODISTS). In 1891 the Church was divided, a minority of the members withdrawing and organizing the United Evangelical Church. Among the activities of the Evangelical Association are publishing houses, educational institutions, charitable organizations, a Church Extension Society and a Young People's Alliance. The organization has done much to promote religious liberty and to break down denominational barriers.

Ev'ans, Augusta Jane. See WILSON, AUGUSTA JANE EVANS.

Evans, Robley Dunglison (1846-1912), an American naval officer, born in Virginia and educated at Annapolis. During the Civil War he participated in both attacks upon Ft. Fisher, in the second of which he was severely wounded. Reentering the service in 1866, he commanded the *Yorktown* in the harbor of Valparaiso, Chile, during the critical time of 1891, and in 1896 was put in command of the *Indiana.* During the Spanish-American War he commanded the battleship *Iowa* and took an active part in the destruction of Cervera's fleet. In 1901 he was promoted rear-admiral. He was in command of the United States fleet during the first part of its trip around the world in President Roosevelt's administration, but resigned when the fleet reached San Francisco because

of ill health. He retired from service in 1908. He wrote *A Sailor's Log* and various magazine articles. He was popularly known as "Fighting Bob" Evans.

Ev'anston, Ill., a city of Cook Co., 12 m. n. of Chicago, on Lake Michigan and on the Chicago & North Western and the Chicago, Milwaukee & St. Paul railroads. There are also elevated and electric railroads to Chicago, of which city it is a popular residential suburb, and an electric line to Milwaukee. The city is attractively located, with wide and beautifully shaded streets and many handsome residences. Evanston is a noted educational center, and the city is the seat of Northwestern University (Methodist Episcopal), coeducational, opened in 1855 (See NORTHWESTERN UNIVERSITY). The Swedish, Danish, and Norwegian Theological schools and the Cumnock School of Oratory are affiliated with the university. The principal manufactures include steel and wrought-iron pipe, brick and bakers' machinery. Evanston was the home of Frances E. Willard. The place was incorporated as a village in 1872 and a city charter was granted in 1892. Population in 1920, 37,234.

Ev'ansville, Ind., a city, port of entry and county seat of Vanderburg Co., 170 m. s.w. of Indianapolis and 122 m. s.w. of Louisville, Ky., on the north bank of the Ohio River, and on the Chicago & Eastern Illinois, the Illinois Central, the Louisville & Nashville, the Southern, Louisville, Henderson & St. Louis and the Big Four railroads. The city is an important port for the Ohio River steamers for both passengers and freight. Six interurban lines connect with the general electric system of the southern portion of the state. Evansville is situated on a plateau above the river, and its numerous railway connections and situation in a coal-mining and tobacco-growing region, combined with the large tonnage of the Ohio River, make it the chief commercial and manufacturing center of southern Indiana and the second city of the state.

PARKS AND BOULEVARDS. Evansville is attractively located and contains many miles of well-shaded and paved streets and many handsome residences. There are a number of parks, chief of which are Garvin, Cooks, Bayard, Mesker and Sunset.

PUBLIC BUILDINGS. Among the prominent buildings are the courthouse, city hall, custom-house, Elks' Club, Evans Temperance Hall, a monastery, a number of banks, substantial business houses and many fine churches.

INSTITUTIONS. The educational institutions include a high school, Junior High School and Manual Training School, St. Joseph's Academy, Willard Library and Art Gallery and public and parochial schools. Among the benevolent and charitable institutions are the Southern Indiana Hospital for the insane, a home for the aged, the United States Marine and St. Mary's hospitals.

INDUSTRIES. The prosperity of Evansville is chiefly derived from trade and manufacture. The city is one of the largest hardwood lumber markets in the country and has an important shipping trade in agricultural products, pork, corn, coal, wheat, dried fruits, packed meats, limestone, flour and tobacco. There are also extensive manufactories of stoves and heaters, furniture, machinery, saddlery and harness, planing and sawmill products, cotton and woolen goods, railway cars, cigars, soft drinks, leather, brick and tile, pottery, terra cotta, fireclay products and agricultural implements. Evansville is the cheapest soft-coal market in the world, there being five mines within the corporate limits of the city and, within a radius of 50 m., approximately 60 mines.

HISTORY. Evansville was laid out as a town in 1817 and named in honor of Robert Morgan Evans, one of its founders and an officer in the War of 1812. The place soon became a thriving commercial port with a large river trade. The town was incorporated in 1819 and city charter granted in 1847. Population in 1920, U. S. Census, 85,264.

Evap"ora'tion, the process of slowly changing a substance, especially a liquid,

to a vapor. It takes place without the formation of bubbles. Evaporation is constantly taking place and is the cause of much of the drying of walks and buildings after a rain, the drying of clothes and the disappearance of the dew and of snow. The moisture is taken up into the air where it rises far above the earth, partially condenses and then descends again in rain. As heat is required to effect evaporation, so evaporation lowers the temperature of surrounding objects. Evaporation takes place more quickly at higher temperatures and also with a greater amount of exposed surface. The less water vapor the air contains, the greater will be the amount of evaporation. The characteristic odors given off by iron, copper and brass are by some believed to be due to an insensible evaporation of these substances.

EBULLITION. When a liquid is heated so hot that bubbles of vapor are formed within the body of the liquid, it is said to be at the boiling point. The formation of vapor bubbles within the liquid is called ebullition. See BOILING POINT; CALORIMETRY.

SUBLIMATION. When a substance passes directly from the solid to the vapor state without passing through the liquid state, it is said to sublime, and the process is called sublimation. The most common example is the disappearance of frost without wetting the surface on which it has been deposited.

Ev'arts, William Maxwell (1818-1901), an eminent American lawyer and orator, born in Boston. He graduated at Yale in 1837, was admitted to the bar in 1841 and soon established a high reputation for learning and ability. From 1851 to 1853 he was district attorney of New York City. In 1868 he was chief counsel for President Johnson in his impeachment trial, and after the trial served as attorney-general until the end of Johnson's administration. He was counsel for the United States in the Alabama Claims case in 1872. In 1877 he was counsel for Hayes in the Hayes-Tilden contest, and became secretary of state in Hayes's cabinet. He was United States senator from 1885 to 1891. Evarts ranks as one of the most eminent lawyers that America has produced, and he conducted a large number of prominent and important cases. He was a brilliant orator and delivered many notable addresses, among them a eulogy on Chief Justice Chase, the Centennial oration at Philadelphia in 1876, and the address at the unveiling of Bartholdi's Statue of Liberty in New York Harbor.

Ev'eleth, Minn., a city of St. Louis Co., about 71 m. n.w. of Duluth, on the Duluth, Missabe & Northern, the Duluth & Iron Range and other railroads. The town is situated in the midst of the hematite iron-ore deposits of the Mesaba Range, the most valuable in the Lake Superior district. The principal industry is the mining and shipping of ore. Eveleth is administered under a revised charter of 1905. Population in 1920, 7,205.

Evening Schools. These are maintained for the most part in cities, and are intended primarily for those whose circumstances compel them to devote the day to the earning of a livelihood. Those of Germany may be said to have developed from Sunday schools, which about 1760 began to offer some of the courses of the elementary school, in addition to religious instruction. Many of the German evening schools offer technical courses especially adapted to the needs of those employed in the industries of the locality. France and Great Britain also support many evening schools at the expense of the State, and, because at the present time illiteracy is less and less common everywhere, the trend in these countries also is toward the development of advanced and technical courses.

The evening schools of the United States have been developed since about 1850. In some, the principal aim is to give those who have come from other lands an opportunity to master the English language and the most essential principles of American history and civil government. In others, those who have never learned to read in any language receive the instruction offered by primary day schools. But the operation of com-

pulsory school laws in the United States also is lessening the number of illiterates. Many private institutions and city boards of education support evening schools, in which technical courses of various kinds are open to all who desire. The Young Men's Christian Association offers a variety of courses in almost every large city. The enrollment in the evening schools of the country constantly increases, and about one-half of those enrolled are usually in attendance. See Cooper Union; Drexel Institute of Art, Science and Industry; Armour Institute of Technology; Simmons College; Lewis Institute; Trade Schools.

Ev'erett, Edward (1794-1865), an American orator and statesman, born in Dorchester, Mass. He graduated at Harvard with the highest honors in 1811. He became pastor of the Unitarian church in Brattle Square, Boston, at the age of 19, and soon attracted wide attention by his eloquence. Two years later he was appointed professor of Greek in Harvard. He traveled and studied in Europe for four years, returning home in 1819 to enter upon his professional duties.

In 1820 he became editor of the *North American Review,* to which he contributed more than 100 articles. He was elected to Congress in 1824, where he served for ten years. From 1835 to 1839 he was governor of Massachusetts; became minister to England in 1841; was president of Harvard from 1846 to 1849; was made secretary of state in 1852; and in 1853 entered the United States Senate. Against his wishes he was nominated for vice-president of the United States by the Constitutional Union Party in 1860, and thereafter retired to private life.

Everett was one of the really great orators of American history. One of his contributions to the public good was the assistance which he rendered the movement to purchase Mt. Vernon and make it a fitting memorial to Washington. He delivered his address on Washington 122 times and gave the proceeds to the Mt. Vernon fund. By his lectures he donated nearly $100,000 to various benevolent enterprises.

Everett, Mass., a city of Middlesex Co., 3 m. n. of Boston, adjoining Chelsea, on the Boston & Maine and other railroads. It has electric railroad connection with Boston, Lynn, Chelsea, Salem and other cities and towns in the vicinity. Everett is primarily a residential town and includes many Boston business men and their families among the residents. Everett covers an area of over three square miles. Among the public institutions are the Frederick E. Parlin Memorial Library, the Shute Memorial Library and the Whidden Memorial Hospital. Everett has varied industrial interests. There are bottling works and manufactories of steel, structural iron, automobiles, varnishes, boots and shoes, wagons, carriages, chemicals and druggists' fittings. The gas and coke industry is important, the coal used being brought from the Virginia mines. Until 1870 Everett was a part of Malden and was known as South Malden. It received a city charter in 1892. Population in 1920, U. S. Census, 40,120.

Everett, Wash., a city, subport of entry and the county seat of Snohomish Co., about 35 m. n. of Seattle, on Puget Sound, at the mouth of the Snohomish River. Railroads entering the city are the Great Northern, the Northern Pacific and the Chicago, Milwaukee & St. Paul. Two interurban electric lines and several large passenger and freight steamers furnish further facilities for transportation. The harbor is a fine one; and this, together with other natural advantages, including abundant mineral resources (gold, silver, copper), has made the city a center of the productive lumbering, mining and agricultural region which surrounds it. The city contains some of the largest lumber plants of the Northwest, and has extensive shipyards, paper and pulp mills, shingle mills and sash and door factories. There are also smelting and refining works, a United States assayer's office and ironworks. An extensive trade in lumber, shingles, bullion, paper and flour is carried on. Among

the conspicuous buildings of the city are a Carnegie library, a Y. M. C. A. Building, a high school building costing $200,000, and the Pacific College buildings, erected in 1908 by the United Norwegian Lutheran Church. Settled in 1891, Everett was incorporated in 1893. Population in 1920, 27,644.

Evic'tion, removal or expulsion by legal process of a tenant from the property he holds under a lease. The most common causes of eviction are failure to pay rent, destructive or wasteful use of the property and the use of the property for illegal or immoral purposes. The landlord must prove the cause alleged or he is liable to suit for damages by the evicted tenant.

Ev'idence, in law, "all the legal means which tend to prove or disprove any matter of fact, the truth of which is submitted to legal investigation." Evidence may be divided into two general classes, oral and documentary. Oral evidence includes statements made by witnesses before the court during the trial; documentary evidence consists of papers containing writing or other marks capable of being read and which are submitted during the trial.

Oral Evidence. Oral evidence is subject to several limitations. Chief among these are the following:

1. It must consist of statements of facts personally known by the witness. Hearsay evidence, that is, statements which the witness heard others make, is not admissible.

2. It must consist of statements of fact. The opinions of the witness are not admissible except under certain conditions allowed by the trial judge, such as the opinion of the distance of an automobile from the person injured when warning was given, and the opinion of the rate of speed at which the automobile was moving.

3. It must relate to the case on trial. Usually direct relation is required, but indirect relation may be admitted if it has an important bearing on the case.

Documentary Evidence. Documentary evidence is considered as primary or secondary. It is primary when the document itself is produced for inspection by the court. If a document is in counterparts, each counterpart is primary evidence. When the document has been duplicated by printing or any other process that assures an exact copy, each copy is primary evidence of the other copies, but no copy is primary evidence of the original. Documentary evidence is secondary when, in lieu of the original document, copies of the original are submitted by one who has seen the original and compared the copy with it, and when office copies, official copies and records are submitted. Before the secondary evidence can be received, the party offering it must satisfy the court that the original cannot be produced. Statutes concerning the introduction of documentary evidence vary in different states, but, in general, documents executed under the seal of a notary public or other officer authorized to administer oaths are admissible.

Expert Evidence. Expert evidence is that given by specialists, such as physicians and scientists, who devote their time to expert work. The specialist must convince the court that he is qualified to give the evidence expected of him, and his testimony consists of facts and his opinions upon the bearing of these facts upon the case. This is because he is more qualified than the jury to form an opinion upon these facts.

Other Evidence. Thumb and finger marks, clothing, weapons and other objects may be admitted as evidence if they have a bearing on the case, but their admission usually is determined by the court.

Burden of Proof. The burden of proof must rest with one party or the other, and it is usually considered to rest with the party against whom judgment must be given if no evidence is produced in his favor. In criminal cases it rests with the prosecution, and the crime must be proved beyond reasonable doubt to secure conviction. In criminal cases the defendant cannot be compelled to testify against himself. See Jury.

Evolu'tion (from Latin *evolvere,* to unroll), a word meaning an unfolding or unrolling, as a scroll; hence, the process of developing what is contained or implied in something. The term has come to be applied in modern usage to the theory that the existing order of things is the result of a natural unfolding of what existed potentially or in germ in earlier and simpler forms of life, or in the original "world stuff." Evolution, therefore, is a method of growth, not a philosophy of nature. It does not deal with the ultimate nature of reality, but rather presupposes reality. It starts at a given point, with an existing substance or order of life. Whether this is eternal or was created, whether it is in the last analysis material or spiritual, evolution does not ask. As a method or process of development it may be accepted, therefore, equally by theist or agnostic, by materialist or idealist.

Evolution is commonly used with a wider application than is development. The latter refers to an individual, the former to a race or to the world in general. The two essential factors in evolution are the existing germ containing the potentialities of development, and the unfolding of this germ by the operation of forces resident within it. The development proceeds from simpler forms to more complex forms of life, like the growth from the simple sapling to the complexly branching tree (differentiation). It also proceeds in the direction of increasing unification and better control of organism (integration). Thus the complex and highly organized forms of life now existing have descended in the course of time from simpler forms of life, and these in turn from still simpler forms, and so on back, until the imagination loses itself in the obscurity of the beginnings of things.

It is not yet fully demonstrated that evolution is the true method of world development; but there are many things that point so decidedly in that direction as to make a strong presumption in favor of the theory, and its acceptance is now almost universal. The analogy between the development of an individual from the embryo and of a race of plants or animals from simpler forms of life is most striking. An almost continuous line of development may be observed in species of plants and animals now in existence and in fossil remains. In the supposed evolution of birds from reptiles, for instance, the geologist has discovered forms which indicate that the earliest birds were winged and feathered reptiles. All are familiar with the changes that take place in the structure of plants and animals as a result of selective breeding; and analogous changes appear in natural selection and the influence of new environment, tending toward the "survival of the fittest." The acceptance of evolution has also been greatly furthered by the successful way in which the doctrine explains the facts of nature and forms a point of departure for new research. It furnishes a workable hypothesis for the comprehension and study of the forms of life.

The idea of evolution has been of gradual formation. Traces of it are found in Empedocles, and it was elaborated by Aristotle. In modern times Laplace applied the idea to astronomy in his famous nebular hypothesis (See NEBULAR HYPOTHESIS), and Lyell used it in descriptive geology. Through Leibnitz, Schelling, Kant, Buffon, Erasmus Darwin, Lamarck, Goethe and many others the idea may be traced to its more complete formulation as an organic part of our modern thinking in the epoch-making work of Charles Darwin and the writings of Alfred Russel Wallace, Ernst Haeckel, John Fiske and Herbert Spencer. The doctrine of evolution has profoundly influenced human thought, almost to the extent of revolutionizing it.

Ew'art, John Skirving (1849-), a Canadian lawyer, born in Toronto and educated at Upper Canada College. He practiced in Winnipeg until 1904, when he became head of a leading firm of Ottawa. He was appointed solicitor for the Canadian Pacific Railway, Ottawa, in 1908 and was chief counsel for Canada at The Hague Tribunal in 1910. Be-

sides contributing to the *Queen's Quarterly* and similar organs, he has published several legal works, a brochure on *Sir John Macdonald and the Canadian Flag* and another on *Canadian Independence*.

Ewell, *U' el,* **Richard Stoddert** (1817-1872), an American soldier, born at Washington, D. C., and educated at West Point. He was brevetted captain in the Mexican War, participated in the Indian campaigns of 1857, and in 1861 joined the Confederate army. He was shortly commissioned major-general, was division commander at both battles of Bull Run and at Antietam, and following the death of "Stonewall" Jackson, with the rank of lieutenant-general, commanded the latter's corps. He was conspicuous at Gettysburg and the Wilderness, but early in April, 1865, was captured with his entire force by Sheridan. Following the war he engaged in stock raising in Tennessee.

Exchange', originally the commercial term used to denote the exchange of one commodity for another, but now used with two significations. The first denotes a series of transactions by which debts are paid without the actual transmission of money between the parties. This is accomplished by the use of checks, bank drafts and money orders. When these orders are sent to foreign countries they are known as bills of foreign exchange. Exchange is at par when bought for its face value, below par when bought for less than its face value, and above par when bought for more than its face value. See BANKS AND BANKING.

The second application of the term is to those organizations in cities which have for their purpose the promotion of certain commercial enterprises, such as a stock exchange, composed of members who deal in stocks and bonds, and the cotton exchange, whose members deal in cotton. Similar organizations which deal in grain are generally called boards of trade. See BOARD OF TRADE.

Ex'cise Tax. See TAX.

Executor, *Eg zek' u tor,* one to whom is committed a person's last will and testament for the purpose of executing the instrument after the testator's death. The duties of the executor may or may not be prescribed in the will. If not prescribed, the law generally holds that the executor should bury the deceased in a manner suitable to the estate left; that he should collect within reasonable time the personal property of the deceased; prove the will; and take out administration papers, under which he will proceed to administer the estate according to the laws of the state.

Ex'odus, the second book of the Bible and of the Pentateuch, named from a Greek word signifying a going out. *Exodus* thus receives its name from the principal event therein related—the migration of the Israelites from Egypt to Canaan. The book begins where *Genesis* concludes, with the death of Joseph, and includes the birth of Moses, his early life and call, the ten plagues and deliverance of the Children of Israel from slavery, the institution of the Passover, the passage of the Red Sea, the providing of manna, the pronouncement of the Ten Commandments and various laws and ordinances, instructions for making the Tabernacle, the Ark and other accessories of worship, and the consecration of the family of Aaron to the priesthood.

Expan'sion, in physics, the increase in bulk of a substance, due to heat. With very few exceptions, the application of heat expands a body, while the application of cold, or rather the withdrawal of heat, contracts it. If the expansion of a solid is considered as taking place in but one direction, it is spoken of as linear expansion; in two dimensions it is superficial expansion, and in all dimensions, cubical expansion. The fractional increase of length which a substance takes on by expansion when its temperature is raised one degree, is known as the coefficient of linear expansion; the coefficient of superficial expansion is twice this, and that of cubical expansion three times.

The coefficient of expansion differs greatly for different substances: that of

copper is nearly twice that of platinum. This expansion of metals is provided for in laying rails on a track, where space is left between the rails to allow for their expansion in warm weather. The pendulums of clocks and other metallic instruments also require regulation for differences in length at different temperatures (See PENDULUM). India rubber is a notable exception to solids, as it contracts when heated. Liquids have no definite form and for that reason their expansion is understood to be cubical expansion. The expansion of liquids is very much less regular than that of solids. Water on cooling from moderate temperatures contracts till it reaches 4° C.; it then expands slightly till it reaches 0° C.; it then expands about 1/11 of its bulk in freezing. This accounts for ice being formed only at the surface of ponds; when all the water has cooled to 4° C., or 39.2° F., the surface water that is cooled still more and hence becomes a little lighter, remains on top and freezes there. The great expansion of water on freezing also accounts for the bursting of water pipes in cold weather. Gases expand far more rapidly than solids or liquids. See GASES, LAWS OF.

Exposition, Industrial, an exposition of the industries and arts for the purpose of stimulating public interest and promoting trade. The first industrial exhibition was held at Paris in 1798, which proved so successful that a series of them was held, beginning in 1802. The first French Exposition Universelle was opened in Paris in 1855, with buildings in the Champs Élyseés covering 24 acres, and there were 24,000 exhibitors. London held an international exhibition in 1862 and the famous Crystal Palace was built to house it. In 1867 the second French International Exhibition was opened in Paris, occupying about 37 acres on the Champ de Mars, with nearly 50,000 exhibitors and an attendance of 10,000,000 persons. The Centennial Exhibition in 1876 at Philadelphia was held to celebrate the centennial of the American Declaration of Independence. This covered 60 acres and had nearly 10,000,000 visitors. In 1878 at Paris a third French International Exhibition was held, and a fourth one in 1889 to commemorate the centenary of the French Revolution at the same place. The celebrated Eiffel Tower was its principal feature (See EIFFEL TOWER). In order to commemorate the 400th anniversary of the discovery of America, the World's Columbian Exposition was held in Chicago in 1893, and was an international exhibition of great magnitude. In 1900 another exhibition of international character was held in Paris. In 1904 an exhibition commemorating the Louisiana Purchase was held in St. Louis. See WORLD'S COLUMBIAN EXPOSITION; LOUISIANA PURCHASE EXPOSITION.

Expositions for special purposes have been held in recent years at San Francisco, Cal., Atlanta, Ga., Nashville, Tenn., Omaha, Neb., New Orleans, La., Buffalo, N. Y., Charleston, S. C., Portland, Ore., and Seattle, Wash. To celebrate the opening of the Panama Canal in 1915, San Francisco held an international exhibition which possessed great attractions and was of majestic proportions.

Ex Post Fac'to Law. A law is said to be *ex post facto,* or retroactive, when it is enacted to punish an offense committed before the passing of the law, the term meaning "from something done afterward," or "after the fact." It is proper that any law shall not be in effect until a certain number of days after its passage, as such delay gives all an opportunity to become acquainted with its provisions. When public welfare, however, demands prompt action to meet an emergency, a law may become effective upon the day it is passed and signed by the executive. Not only does the Constitution of the United States expressly decree that no *ex post facto* law shall be passed, but in no enlightened country today is such legislation permitted, as such a law might make a deed a crime which was not a crime when committed and lead to unjust punishment.

Express', a business originated in 1839 for the transmission of money and

small parcels between Boston and New York, now one of the most important factors in the commerce of the world. Stage drivers had previously transacted some business of this sort for a small consideration; but William F. Harnden first entered the field in earnest, and his success encouraged others to devote their energy to the business. Today, express companies receive deposits for safe-keeping, collect debts in the United States and in foreign countries, and perform an astonishing variety of unusual commissions, beside transmitting money or property to any part of the world and issuing travelers' checks, preferred by many to bank letters of credit. The leading express companies in the United States were the American, the Adams, the Wells Fargo and the United States. The Northern Pacific and Great Northern Railway systems both had an express company operating over their lines. During the World War all of the railway express companies were combined and their business carried on under direction of the government. In Europe, the government post offices transact much business of this character.

Extradition, *Ex"tra dish' un,* the delivery of a fugitive by one state to another. In the United States extradition has two specific meanings. First, it refers to the surrender by one state government to the authorities of another state of a criminal who seeks to escape arrest and trial by fleeing from the state in which the crime was committed; second, it refers to the surrender of a criminal from one nation to another. The demand for extradition made by one nation upon another is a matter of international law. The Jay Treaty of November, 1794, with Great Britain made provision for extradition powers for 12 years. After its expiration no provisions were made for extradition until 1842, when the Webster-Ashburton Treaty was concluded. France was the next country to enter into an extradition treaty with the United States, and 24 foreign governments have since provided for the mutual extradition of criminals. In order to justify an extradition claim it is necessary to establish that the supreme political authority, in the country where the crime has been committed, has demanded the surrender of the criminal and that an inquiry has been made into the facts of the case by a United States commissioner or judge under direction of the president. Criminals are extradited from one state to another in the Union on the demand of the governor of the state from which the criminal has fled. A man may be extradited from the United States only for crimes included within the term *felony.*

Eyck, van, *Vahn Ike',* the family name of two brothers, **Hubert** (about 1370-1426) and **Jan** (about 1390-1440), founders of painting in Flanders, Holland and Germany. They were born at Maaseyck, a little town on the Maas, from which they took their name. Little is known of the life of the elder brother, but of Jan, who was one of the greatest of portrait painters, it is known that he was for a time in the service of the Count of Holland (John of Bavaria) and later court painter to Philip the Good, Duke of Burgundy, who sent him on various embassies. The service to art of these two brothers is of inestimable value and their place in the evolution of Flemish painting unique. While they were not the inventors of oil painting, as has been repeatedly stated, they made many improvements in this medium which led to its universal adoption. They also made a tremendous advance in technique, painting with greater realism than their predecessors. The Van Eycks introduced freshness and naturalism into their landscape backgrounds and life and vitality into figures. Their masterpiece is an altarpiece in 28 panels depicting the *Redemption from Sin,* painted for the Cathedral of Ghent and now divided between the towns of Ghent, Berlin and Brussels. Numerous other works ascribed to the individual or joint efforts of the Van Eycks are distributed throughout Europe.

Eye, the organ of vision. The term is used to denote the eyeball, the essen-

EYE

tial anatomical feature of the eye, but may also include connecting parts. These superficial parts of the eye are important. The eyelids are two folds of skin, fringed with short hairs, which protect the eye from dust or other foreign particles. A lachrymal gland, about the size of an almond, is situated near the surface, between the eyeball and the temple. These glands secrete a salty fluid, which flows continuously across the front of the eye, bathing the cornea and passing into a basin at the inner corner of the eye, called the lachrymal lake. From this they are drained through ducts into the nasal passage. Excessive secretion of the liquid causes an overflow in tears upon the face.

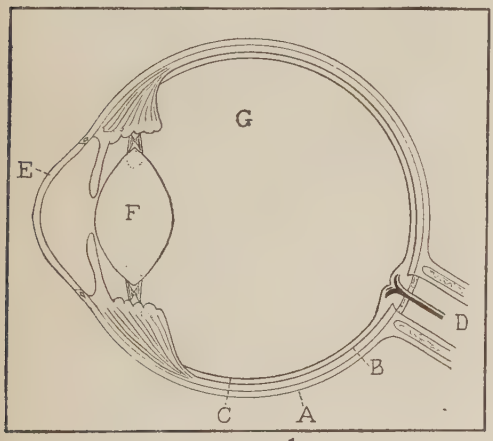


FIGURE 1

A, sclerotic membrane; B, choroid membrane; C, retina; D, optic nerve; E, cornea; F, crystalline lens; G, vitreous humor.

The eyeball is nearly spherical in shape and about an inch in diameter. It lies in a cavity of the skull, on all sides of which it is supported by a cushion of fat and by muscles. By means of these muscles, the eye can be moved in every direction. Three coats cover the globe of the eye. The sclerotic, or outer coat, is a tough, thick, whitish, opaque membrane covering about five-sixths of the surface. In the front it is continuous, with a transparent, convex disk called the cornea, which covers the remaining surface and which bulges out somewhat beyond the limits of the sphere. The choroid coat lies within the sclerotic membrane, and ends at the cornea in front in a ciliary process. It contains nerves, blood vessels and cells of coloring matter. By means of this coat the interior of the eye is transformed into a dark chamber. The optic nerve, passing from the brain, enters the ball of the eye at the back, and, branching out, forms a third coat inside the choroid membrane, called the retina. The retina is of complex structure. It is only about 1/80 of an inch thick, but is made up of ten distinct layers of nerve fibers, membranes, rods and cones. The point at which the optic nerve enters the eye is called the blind spot, because here the nerve fibers are not sensitive to light. The slight depression near the blind spot is the point of clearest vision.

The eyeball is divided by the crystalline lens into two unequal chambers. This lens has the appearance of glass. It is about one-third of an inch long and one-fourth of an inch thick, and is held in place by a suspensory ligament connecting with the ciliary process at the termination of the choroid membrane. The lens is the chief focusing instrument of the eye, and by means of the ciliary processes can vary its degree of convexity so as to adapt it to focusing objects at different distances. Figure 2 shows this adaptation at A and B. An extension of the choroid membrane forms a circular curtain in front of the lens, known as the iris. This is the colored portion of the eye. In the center of the iris is a small opening, called the pupil, through which light is admitted into the interior of the eye. The muscles of the iris increase or decrease the size of the pupil and regulate the amount of light which shall enter. Exposure to intense light causes these muscles to contract and narrow the opening. If a sudden change from a light to a dark room be made, objects cannot be distinctly seen until the iris again dilates and admits the light.

The bulging of the cornea leaves a chamber between it and the iris which is

filled with a watery liquid called the aqueous humor. The chamber behind the lens is filled with a glassy, jellylike fluid called the vitreous humor. The light waves pass through the cornea and lens, which focus them upon the retina. After passing through the transparent optic fibers of the retina, they reach the rods and cones. Here they set up a certain stimulation, which causes a nerve current to run along the optic nerve to the brain, and excite the optical centers, which are the seat of vision. The eye acts like a camera, the rays of light passing through the pupil forming upon the retina an inverted image of the ob-

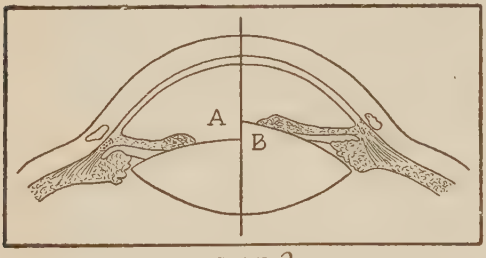


FIGURE 2

ject within the field of vision. If the cornea or lens is too convex, the rays of light are brought to a focus in front of the cornea, and objects are not distinctly seen. Persons affected with this deformity of the eye are said to be shortsighted or nearsighted. The defect is remedied by means of spectacles with concave lenses. If the cornea is too flat the image is brought to a focus back of the retina, and the person is farsighted. This defect is remedied by means of spectacles with convex lenses. See LENS; SPECTACLES.

Eze'kiel, a book of the Old Testament, occupying a place between *Lamentations* and *Daniel;* also one of the greater Hebrew prophets and the author of the book of *Ezekiel.* Ezekiel, son of Buzi, was one of the captives taken away by Nebuchadnezzar about 13 years before the destruction of Jerusalem in 586 B. C. Settled with a Jewish colony on the banks of the Chebar River, he began to prophesy in the fifth year of his exile. The book of *Ezekiel* contains several visions, parables and proverbs, and may be divided into two parts. The first part, including chapters i-xxxix, contains the prophecies spoken before the destruction of Jerusalem. The second part is full of consolation, containing a vision of the final glory of God's people in a new Jerusalem. See BIBLE, subhead *The Old Testament.*

Ez'ra, that book of the Old Testament which, in the English Bible, comes between *Second Chronicles* and *Nehemiah;* also the name of the author of this book. *Ezra* was originally a part of *Nehemiah.* The author of the book was a scribe and priest who went up to Jerusalem as the leader of the second expedition of Jews from Babylon, about 458 B. C., in the reign of Artaxerxes Longimanus. The book, covering a period of 79 years, consists of two parts: the first chronicles the return of the captives in the time of Cyrus and the rebuilding of the Temple; the second part recounts the second immigration to Jerusalem and the reformation of the people by Ezra. See BIBLE, subhead *The Old Testament.*

F

FA'BIUS, an ancient family of legendary Rome. They went on an expedition against the Veientes, fell into an ambush and were killed (477 B. C.) with only one boy surviving. The most famous in the later history was Fabius Maximus, Roman dictator during the Second Punic War, whose policy of avoiding open warfare with Hannibal was so successful. Quintus Fabius Pictor, who lived at the same period, was the earliest writer of Roman history in prose. He wrote the chronicles of the famous families of Rome, and an account of the Second Punic War, in which he took part.

Fa'ble. See FICTION, subhead *The Fable.*

Fac'tory, an establishment where wage earners work in large groups organized for the purpose of production of commodities. The factory became an important industrial unit at the time of the introduction of machinery and steam power in the middle of the 18th century. The first factory in England was a silk mill. The first cotton mill in America was built in 1803 by Samuel Slater.

FACTORY SYSTEM. The use of machinery and the concentration of effort through division of labor led to a rapid growth of industries in the beginning of the 19th century. A great number of factories were established, and the evils attendant upon the indiscriminate massing together of laborers were many and serious. At first the factory system was unregulated. Insanitary conditions, overworking and the employment of children and women in dangerous occupations prevailed. The employers did not come into immediate contact with employees and took no thought for their welfare. All this changed when the public conscience was awakened to the need of factory inspection, and for over a century legislation has been directed toward the improvement of conditions in the factories, the regulation of the length of the working day and the exclusion of women and children from employment too taxing for their health and strength. The buildings in which employees work must be properly ventilated, sanitary, well lighted and heated, have means of easy egress and be protected against fire. The International Association of Factory Inspection, including Canada and several of the states of the Union, was organized at Philadelphia in 1886. All states in which there are large manufactories now have laws safeguarding the employees and prohibiting the employment of children under a specified age. The compulsory education laws also prohibit the employment of minors who have not reached the educational standard set by the law.

SWEATING SYSTEM. A task, or contract, system originated in the early part of the 19th century and became known as the sweating, or sweat-shop, system. Contractors sublet their contracts to subcontractors. These subcontractors do the work in smaller workshops, engage workmen with but little skill and efficiency at a low wage-rate, and the margin between the wages they pay and the contract price is their profit. Many of the laborers are foreigners who desire to learn a trade and work from 12 to 16 hours per day. When they learn rapidly, the profit to the subcontractor, or sweater, is large. The sweating system originated and prevails in the tailoring trade. Within recent years it has been under legislative control. See CHILD LABOR; LABOR ORGANIZATIONS.

Fahrenheit, *Fah' ren hite,* **Gabriel Daniel** (1686-1736), a German scientist,

born at Danzig, Prussia. His early education and training had in view a business career, but, becoming greatly interested in natural philosophy, he abandoned his business pursuits and went to Holland to study. When he was about 34 years of age he conceived the idea of using quicksilver instead of alcohol for the purpose of determining temperature. This idea he worked out successfully, made a new scale for thermometers, placing freezing point at 32°, and gave to the world the Fahrenheit thermometer, which is very generally used for ordinary purposes. He also made other valuable discoveries in natural philosophy. In 1724 he was elected a member of the Royal Society. See THERMOMETER.

Faïence, *Fa"yahnz'*, a fine variety of pottery, which is an imitation of porcelain. It excels common pottery ware in beauty of form, decoration and glazing. True faïence is made of yellowish clay, usually covered with white enamel, though the enamel may be colored. The ware derived its name from the town of Faenza in Italy, where a variety of pottery known as majolica was manufactured in the 14th century. Modern faïence was probably invented at this town about the middle of the 16th century as an imitation of majolica. See MAJOLICA.

Fainting, loss of consciousness due to lack of proper supply of blood in the brain. It is accompanied by loss of sensation and power of motion, pallor, feeble heart action and sometimes temporary failure of respiration. It may be brought on by a shock, such as fear, great joy or grief may cause, or by excessive pain, loss of blood, etc. The clothing about the throat and chest should be loosened, and the patient should be placed upon his back with his head and chest lower than the rest of his body. Plenty of fresh air should be given by fanning, if not otherwise supplied. Smelling salts sometimes prove efficacious, and strong coffee or a few drops of ammonia may be given. If the attack continues, a physician should be sent for. During returning consciousness excitement of any kind should be avoided and quiet insured.

Fair'bairn, Andrew Martin (1838-1912), a noted English theologian, principal of Mansfield College, Oxford, born near Edinburgh. He was educated at the universities of Edinburgh, Glasgow and Berlin. After a ministry of 17 years in Scottish churches, he became principal of Airedale College, Bradford, England, in 1878, where he remained for seven years, lecturing at the University of Edinburgh in 1881-83. When the Congregationalists founded Mansfield College at Oxford in 1886, Dr. Fairbairn was appointed its first principal and retained the position until he retired on account of age in 1909. When he began his services there the "Oxford Movement" under the leadership of John Henry Newman was very strong. Principal Fairbairn was a man of equal intellectual ability and probably did more than any other man to turn the tide. He lectured frequently in the United States, where he was greatly admired. Among his most important works are *The Place of Christ in Modern Theology; Catholicism, Roman and Anglican;* and *The Philosophy of the Christian Religion.* See OXFORD MOVEMENT.

Fair'banks, Charles Warren (1852-1918), a former vice-president of the United States, born near Unionville Centre, Union Co., Ohio, and educated at Ohio Wesleyan University. He was admitted to the bar of the Supreme Court of Ohio in 1874, moved to Indianapolis, Ind., in the same year, where he practiced for 23 years, and was elected to the United States Senate in 1897, and again in 1903. He was a member of the United States and British Joint High Commission, which met in Quebec in 1898 to adjust Canadian matters, and was chairman of the United States High Commissioners. He was delegate-at-large to the Republican National Convention at St. Louis in 1896, at Philadelphia in 1900 and at Chicago in 1904, holding important positions in each convention. Mr. Fairbanks was unanimously nominated for vice-president of the

United States at the convention in Chicago in 1904, and was elected with Theodore Roosevelt.

Fair'child, Lucius (1831-1896), an American soldier, born at Franklin Mills, Ohio. In 1846 he removed with his father to Wisconsin. He went to California during the gold excitement in 1849, returning after six years no richer than when he left. He studied law and was admitted to the bar in 1860. In 1861 he enlisted in the army, was made captain of volunteers, and later, captain in the regular army. At the Battle of Bull Run he commanded part of the famous "iron brigade." He lost his left arm at Gettysburg. In 1863 he was made brigadier-general of volunteers. He soon resigned, however, became secretary of state for Wisconsin, and was then elected governor, serving for six consecutive terms. He was appointed consul at Liverpool in 1872 and held this office until 1878, when he became consul-general at Paris, and in 1880, minister to Spain. He resigned and returned to Madison, Wis., in 1882. In 1886 he was elected commander-in-chief of the Grand Army of the Republic.

Fair'fax, Thomas (1612-1671), an English soldier and statesman. During the struggle between Charles I and Parliament, he was cavalry officer in the Parliamentary army, distinguishing himself at Marston Moor. Later, while commanding all Parliamentary forces, he received great credit for the victory at Naseby, but he was subsequently superseded by Cromwell for refusing to march against the Scotch who supported Charles II. Afterwards he belonged to Parliament and treated with Charles II. He wrote an account of the Civil War.

Fair'mont, W. Va., a city and the county seat of Marion Co., 77 m. s.e. of Wheeling, on the Monongahela River and on the Baltimore & Ohio and other railroads. The city, built on both sides of the river, is in a region rich in coal; and large quantities of coal are mined and shipped. Among the manufactories and other industrial plants are flour mills, glass factories, planing mills, furniture factories, foundries, machine shops and manufactories of lumber, cigars and machinery. A state normal school is located here; and there is a miners' hospital, maintained by the state, and a fine courthouse. In 1819 the place was laid out and was called Middletown; it became the county seat in 1842 and two years later received its present name. The city was chartered in 1899. Population in 1920, 17,851.

Fair Oaks, Battle of, an important engagement of the Civil War, fought about seven miles east of Richmond, Va., May 31 and June 1, 1862, between 42,000 Federals under McClellan, and about an equal number of Confederates under Johnston and G. W. Smith. While following Johnston on his retreat from Williamsburg toward Richmond, McClellan reached the Chickahominy, across which he threw his left wing, under Heintzelman and Keyes. On the morning of May 31 Johnston sent D. H. Hill, supported by Longstreet, to attack the two corps that had crossed the river. Johnston soon joined the fight, and the Federals were almost beaten when Sumner arrived with reinforcements. The Confederates were now thrown into confusion, being driven back with great slaughter, and Johnston himself was severely wounded. Command then fell upon General Smith and, later, upon General Lee, who withdrew toward Richmond about noon the following day. The Confederates lost about 5200 men; the Federals, about 5000. The honor of this victory for the Army of the Potomac belonged chiefly to Sumner. McClellan was blamed for not having marched at once to Richmond, the spires of which could be seen from the battlefield.

Fairweather, Mount, a mountain of southeastern Alaska lying in the St. Elias Range on the boundary between British Columbia and the narrow strip of Alaska's "panhandle." It lies about 15 m. inland, and its elevation is given as 14,580 ft., although some suppose it to be much higher. The mountain takes

its name from Cape Fairweather, directly west of it.

Fairy, in myths, a delicate, ravishing creature who interfered in men's affairs. Belief in fairies has come down to the present time, and is spread from Ireland, where these spirits are thought to inhabit the "raths," to Australia, Samoa and to the Arabs and Moors, whose fairy is called *Jān*. A human being who has tasted food in fairyland is believed doomed to dwell there eternally. Certain women fairies are believed to lure human lovers to death. Nereids, Oreads and Naiads are thought to be fairies of wells, of mountains and of seas. Believers in fairies say that they have superhuman knowledge; that many of them are inspired by the feelings of love, jealousy, envy and vengeance; that they are responsible not only for the disappearance of various objects, but that they spirit folks off in whirls of dust. Against their many pranks, however, the rue is said to be a charm. Still, if you are kind to the fairies you need have no fear; they will be kind to you. For this reason, the people of the Orient address fairies as "blessed ones." Though locally appearing as animals, fairies are popularly supposed to have the human form in miniature. For the Norse fairy, see ELVES.

Faith Cure, the healing of the sick by prayer and by faith in God. Since the beginnings of Christianity numerous cures have been recorded which were reported to have been made without the use of medicines and only by the exercise of faith upon the part of the patient. The touching of sacred relics, carrying of certain jewels and performing of certain tasks were only different forms which the method of cure took. So great was the belief in these cures that for a long time the practice of medicine was held in disrepute, since it seemed to imply a lack of faith in divine power or a desire to interfere therein. Apothecaries were supposed to have a secret league with the Evil One. In the United States in the middle of the 19th century many sects arose having cure by faith as the basis of their religion. These differ from each other in many details and their statements of belief differ widely. Much good has arisen from their work in many instances and there is no lack of earnestness in it. In the United States, however, it is held to be a criminal offense to allow a person to die without giving him proper medical attendance if such can be secured.

Fa'kir, a Mohammedan religious mendicant, more particularly one of the Hindu race. The Hindu fakirs are of two classes, those belonging to the religious orders, and the wandering rogues who overrun the country. The first class are sincerely religious; the second are simply unscrupulous beggars who prey upon the superstitious villagers. They inflict dreadful tortures upon themselves, and most of them are unspeakably filthy.

Fal'con Family, a family of birds of prey, which includes kites and falcons. The birds of this family are characterized by their strong powers of flight, fearlessness as hunters, and their habit of capturing their prey on the wing, seizing it in their sharp, curved claws—the most deadly weapons with which any bird is armed. They all fly by day. They feed upon other birds and small Mammals, and certain species were used in falconry during the Middle Ages (See FALCONRY).

DUCK HAWK. This bird is a good example of the true falcon, and is a race of the European duck hawk which was much used for falconry. It is slaty blue above, barred with dark gray; the top of the head is black; the under parts are deep buff, barred with dark gray; and the throat is white or light buff. The male measures 18 and the female 20 inches in length, the latter being the larger and stronger bird. The four reddish eggs are laid on the bare ground, in hollows in trees or in old nests of other hawks The duck hawk feeds mainly on waterfowl, its flight being so swift as to enable it easily to pursue and capture the swiftest flying ducks. It is found in nearly all parts of the world.

Falconio, Diomede (1842-1917), an American cardinal, born at Pescocostanzo in Abruzzi, Italy. He joined the Franciscan Order when 18 years of age, and five years later was sent as a missionary to the United States, where, after being ordained a priest, he became professor of philosophy and vice-president of St. Bonaventure's College, at Allegany, N. Y., and later, after a year's absence, became its president. For ten years (1872-1882) he was secretary and administrator of the Cathedral of Harbor Grace, Newfoundland, and in 1883 he returned to Italy, where he held many high offices in the Franciscan Order. After being consecrated Bishop of Lacedonia and then Archbishop of Acerenza and Matera, Archbishop Falconio became apostolic delegate to Canada and to the United States. In 1911 he, with two other American archbishops, was created cardinal. He has published a volume entitled *Pastoral Letters.*

Fal'conry, the pursuing of game by means of falcons, and the necessary accompaniment of training the birds for the sport. The name hawking, which is sometimes used synonymously, more accurately refers only to the sport in the field. Two kinds of birds are used: the long-winged, or true, falcons, represented by the gyrfalcons; and the short-winged falcons, represented by the goshawk. These were chained to the wrist of the hunter and were released when the game was sighted. Pigeons, partridges, larks, rooks, magpies, herons, wild ducks and even rabbits were among the animals attacked by the falcons, and the birds so pursued were caught on the wing.

Falconry was a popular sport in England after the Norman Conquest and was practiced by nobles and court ladies. A person's rank could be distinguished by the species of falcon possessed; thus an earl carried a peregrine falcon, etc. In Germany and France falconry was popular about the same time, and the literature of the period, or that concerning those times, abounds in references to the practice. The sport died out in the 17th century and, though later revived, died out almost entirely with the use of firearms in the hunt. Consult Freeman and Salvin, *Falconry, Its Claims and Practice.*

Falk'land Islands, a group of islands in the South Atlantic Ocean, a possession of Great Britain. The two largest islands are known as East and West Falkland; the Island of South Georgia and other smaller islands are uninhabited. They lie about 300 m. east of the Strait of Magellan. The entire area is about 7500 sq. m. There are good harbors and the coasts are greatly indented; the climate is favorable except when continuous drizzling rains and strong winds set in. Sheep farming is practically the only industry, as the soil yields little except grass. There are large unworked deposits of peat. In 1592 Davis visited the islands and they were named by Captain Strong in 1690, when he sailed through Falkland Strait. The French, British and Spanish have had control of the territory; since 1833 it has been in the hands of the British, and the present colony was established in 1851. Stanley, in East Falkland, is the principal town. The population of the islands is about 2000.

Fal'lacy. See Logic.

Fallières, *Fal"yar',* **Clément Armand** (1841-), eighth president of the French Republic. He practiced law and became mayor of Nérac in 1871. Three years later he was elected a Republican member of the Chamber of Deputies from the same place. He soon drew attention as a speaker of the Republican Left. In 1880-82 he was undersecretary for the minister of the interior and prime minister for 22 days in January, 1883. He served in other high positions and became president of the Senate in 1899. He continued to fill this office for seven years. In 1906 he was elected president of France by the Radical Republicans and the Socialists, and he took his seat Feb. 18, serving until 1913. His peasant ancestry and his free and democratic manners made him very popular with the common people.

Falling Bodies. The earth exerts a constant force of attraction on every body, so that if the body is free to move it will fall toward the earth with uniformly accelerated motion (See MOTION, LAWS OF). In the air bodies fall with slightly unequal velocities because of the resistance of the air; but in a vacuum they fall with equal velocities. Neglecting the friction of the air, all freely falling bodies acquire in each second a velocity of 32.16 ft., or 980 centimeters, per second. The velocity acquired accordingly increases in proportion to the time of falling, and the velocity at the end of t seconds is 32.16 x t ft. per second, or 980 x t centimeters per second. Thus at the end of three seconds, a freely falling body would have a velocity of 32.16 x 3, or 96.48, ft. per second.

If the body has an initial velocity, as a ball thrown vertically upward, it begins to acquire a downward velocity the moment it leaves the hand; but it continues to go up until its acquired downward velocity equals its initial upward velocity, when it stops and begins to fall. It will finally reach the earth with a speed equal to that with which it was thrown up, if the air friction can be neglected. Again, when a rifle ball is shot horizontally, it begins to fall the moment it leaves the barrel, and in a given time it will fall the same distance as if it had simply been dropped. To allow for this falling, the sights of a rifle are so placed that the rifle barrel is pointed slightly above the object aimed at. This elevation of the barrel increases with the distance to be shot.

The distance a body will fall in a given time is found by multiplying its average vertical velocity by the time of fall, its average velocity being half the sum of its initial and final velocities. For example, during the first second of fall the average velocity is $\frac{0+32.16}{2}$, and the distance fallen is 16.08 x 1, or 16.08, ft. During the second second it will fall 16.08 ft. as before, and it will also fall 32.16 ft., due to the velocity it acquired during the first second, or a total of 16.08+32.16, or 48.24. The total fall during the two seconds will accordingly be the sum of the distances fallen in the two separate seconds, 16.08+48.24, or 64.32 ft., which is four times the distance fallen in the first second. The general rule is: The distance that a body, starting from rest, will fall in a given time equals 16.08 ft., or 490 centimeters, multiplied by the square of the number of seconds. Stated in formula, using s for distance, $s=16.08\ t^2$ ft., or $s=490\ t^2$ centimeters. If the body has an initial upward or downward velocity, it is only necessary to calculate the distance it would go in the given time due to this velocity, and then add or subtract the result from the distance it would fall in that time as calculated by the rule given above. The distance a body will fall during any given second, as, for example, the fifth, is found by calculating the total distance it will fall in five seconds and subtracting from this the total distance it will fall in four seconds.

Fallow Deer, the spotted deer of Europe and Asia, and the one chiefly seen in English parks and game preserves. Aside from its color, it differs from other deer in having long, slender antlers which are flattened at the ends and branch like the fingers from the palm. The fallow deer is found along the shores of the Mediterranean, where large herds graze upon tender grass or eat fruit and nuts. The skin makes a soft leather, the flesh is desirable and the antlers are of use in cutlery. The animal is so tame, however, that the species would soon be exterminated were it not protected by law.

Fallows, Samuel (1835-), an American bishop of the Reformed Episcopal Church, born at Pendleton, England. When he was 13 years of age the family came to America, settling in Wisconsin. Fallows graduated from Wisconsin University and was for a time professor in Galesville University. He entered the Civil War as chaplain of a Wisconsin regiment, but left the service in 1865 a brigadier-general. He served the State of Wisconsin for three years

as superintendent of public instruction, and subsequently was president of Illinois Wesleyan University. He accepted a call to St. Paul's Reformed Episcopal Church, Chicago, in 1875, and the next year became bishop. Bishop Fallows has assisted in the preparation of several works of reference, and has been engaged in numerous enterprises of great importance.

Fall River, Mass., a city and port of entry of Bristol Co., 49 m. s.w. of Boston and 18 m. s.e. of Providence, R. I., at the mouth of the Taunton River on Mt. Hope Bay, which is the northeastern part of Narragansett Bay, and on the New York, New Haven & Hartford and other railroads. The city is on a good harbor and has steamer connections with Providence, Newport, and New York, notably by the Fall River line between New York and Boston. There are also steamer connections with Philadelphia by the Windsor freight lines of steamers. Fall River is irregularly laid out, with many fine residences built out of native granite, and is situated on slopes rising from the river. The area of the city is 41 sq. m. It has abundant water power furnished by the Quequechan River, the outlet of Watuppa Lake, which descends 130 ft. in the course of half a mile. There are a number of fine public parks.

Among the principal buildings are a state armory, St. Vincent's and St. Joseph's homes, a custom-house, Notre Dame, St. Mary's and St. Anne's churches, First Congregational Church, Second Congregational Church, classical and technical high schools, a city library, Bradford Durfee Textile School, Fall River Training School, Quequechan Club, the Boys' Club, a county courthouse, Notre Dame College and the Academy La Ste. Union des Sacrés Cœurs. It is as a manufacturing center that Fall River is best known. It ranks first in the cotton-milling industry in the United States. Textile weaving and dyeing is one of the great industries, and an extensive hat manufactory furnishes the United States army with hats. There are also manufactories of woolens, thread, rubber goods, bobbins and shuttles, rope, wire, iron and brass products, machinery, calico, soap, twine and knit goods.

Fall River was included within the limits of Freetown until 1803, when it was incorporated under its present name as a separate town. The town was called Troy from 1804 to 1834, when its old name was restored. It received a city charter in 1854. Population in 1920, U. S. Census, 120,485.

False Imprisonment, the illegal confinement of a person against his will, whether in a public prison or a private house. False imprisonment is considered a crime and is punished by the State. The one imprisoned may also recover damages through a civil suit.

False Pretenses, misrepresentations of one's purpose, financial standing or business, for the purpose of obtaining pecuniary or other assistance. Such a misrepresentation is considered a misdemeanor and is punishable by fine or imprisonment, or both.

Fa'ma, in Greek myths, goddess of rumor. She is probably an invention of the poets. Vergil vividly describes her and Ovid tells of her bronze palace.

Family. See BOTANY.

Fam'ine, a distressing scarcity of food affecting the inhabitants of an extensive geographical area. Among the chief causes of famine are irregular rainfall, floods, wars and destructive insects. Famine usually occurs in countries where, as in Ireland, the people depend heavily upon a staple product. Famines are rare in those regions where there is a diversity of activity, and where in the event of failure of one product the other resources can be drawn upon to sustain life. In ancient and medieval times famines were numerous and devastating to the population, but at the present time they are not so frequent, owing partly to the increased facilities for transportation and ready intercourse between countries. India and China have been the scene of many destructive famines; in the latter country as many as

9,000,000 persons perished in 1877 and 1878 from this cause. English rule in India has greatly lessened the loss of life from famine, and the British budget makes annual provision against any need that may arise from failure of the rice crop.

Fan, the name given to various instruments and contrivances for producing air currents. Hand fans for cooling the face were well known to the Egyptians, Greeks and Romans, and were introduced into England during the reign of Henry VIII. They have been made of many different materials, such as the leaf of certain palms, of wood, of feathers, of paper and of thin skins, variously constructed and attached to a handle. The folding fan was introduced by the Japanese in the seventh century, and consists of two portions, one the folded fabric and the other the rigid strips fastened to it, and all pivoted together at one end, so as to open when used and shut up or fold when not in use. Great display of artistic ability is shown in the ornamentation of fans. For the description of a fan as a machine see BLOWING MACHINE.

Faneuil, *Fan"l,* **Hall,** a public building, given to Boston by Peter Faneuil in 1742. As originally planned, it comprised a market house, being enlarged to provide a public hall; but it was burned in January, 1761, the walls alone being saved. The town speedily erected a new building, funds for which were raised partly through a lottery. This building was enlarged in 1805. Faneuil Hall, known as the "Cradle of American Liberty," is one of the most cherished landmarks of Revolutionary times. Here, in 1772, the first Boston Committee of Correspondence was organized; in 1773, the Boston Tea Party was planned; and in 1837, Wendell Phillips made his first anti-slavery speech. See BOSTON TEA PARTY; PHILLIPS, WENDELL.

Far'ad, the practical unit of electric capacity in the electromagnetic system. The microfarad, 1,000,000 times as small, is the more commonly employed unit. A conductor is said to have a capacity of one microfarad, if, when charged with a micro-coulomb of electricity, its potential is changed by one volt; or a condenser is said to have a capacity of one microfarad when a positive charge of one micro-coulomb on one coating and an equal negative charge on the other coating cause a potential difference of one volt between the coatings. See ELECTRIC CAPACITY; LEYDEN JAR.

Far'aday, Michael (1791-1867), an English chemist whose work began in self-planned experiments while he was a bookbinder's apprentice. In 1813 he became Davy's assistant in the laboratory of the Royal Institution at London, and after traveling with Davy for over a year he was made director of the laboratory and later life professor of chemistry in the institution. Faraday's chemical work was chiefly in investigation of chlorine and other gases. His most important work, however, was in the line of electrical discoveries, where his greatest achievement was the discovery of the induction of electric currents. Faraday's work was characterized by the concentration and persistency of his efforts and the accuracy of his statements. His private life is particularly worthy of note on account of his kindly, sympathetic disposition, which rendered him doubly helpful to his students and associates.

Far'go, N. D., a city and the county seat of Cass Co., 265 m. w. of Duluth (Minn.) and 651 m. n.w. of Chicago, on the Red River and on the Chicago, Milwaukee & St. Paul, the Great Northern and the Northern Pacific railroads. The city is situated in a fertile agricultural region producing quantities of wheat. It is an important financial and jobbing center and one of the leading distributing points for heavy farm machinery in the United States.

Fargo is a city of beautiful streets and parkways, and there are many artistic homes. It has two city parks, Island Park and Oak Grove. A modern electric railway system serves the city and connects it with Moorhead (Minn.). An interurban line also connects with Dil-

worth (Minn.), where large car shops are located. The prominent buildings include a courthouse, city hall, Federal Building, Masonic Temple, Y. M. C. A. and Y. W. C. A. buildings, three public libraries, a number of banks, substantial business houses, fine hotels and about 30 churches. It is the seat of a Catholic see and of a Protestant Episcopal bishopric. Fargo is the seat of the North Dakota Agricultural College (coeducational), which receives both Federal and state support. Other colleges include the Fargo College, Sacred Heart Academy (Catholic), Lutheran Training School for women, a central high school, public schools and several business colleges. St. John's and St. Luke's hospitals are among the benevolent institutions. The first settlement was made in 1871 and the place named in honor of W. G. Fargo of the Wells-Fargo Express Company. A city charter was granted in 1875. In 1893 the city suffered from a heavy loss by fire. Population in 1920, 21,961.

Faribault, *Far' i bo"*, **Minn.,** a city and the county seat of Rice Co., about 45 m. s.w. of St. Paul, at the confluence of the Cannon and Straight rivers, and on the Chicago, Rock Island & Pacific, the Chicago, Great Western, the Chicago, Milwaukee & St. Paul and other railroads. There is ample water power and the manufactures include foundry products, gasoline engines, windmills, wagons, carriages, warehouse trucks, furniture, pianos, rattanware, shoes, woolen goods, flour, cane sirup and canned goods. Faribault is situated in a region dotted with attractive lakes and is known as a summer resort. The town offers exceptional educational advantages, being the seat of the state institutions for the deaf, the blind and the feeble-minded; the Shattuck School for boys and St. Mary's School for girls, both under the control of the Protestant Episcopal Church; the Bethlehem Academy for girls (Roman Catholic); the Seabury Divinity School; and the hospital and nurses' training school of the Minnesota District of the Evangelical Synod. The city has a public library. Faribault was permanently settled in 1848 and chartered as a city in 1872. It was named in honor of Jean Baptiste Faribault, a French fur trader. Population in 1920, U. S. Census, 11,089.

Far'ley, John Murphy (1842-1918), an American Roman Catholic clergyman, born at Newton Hamilton in Ireland and educated at St. Marcartan's College in Ireland and at St. John's College at Fordham, N. Y. Later he studied law and spent four years in the American College at Rome, where, in 1872, he was ordained a priest. Subsequently he held the offices of private chamberlain to Pope Leo XIII, vicar-general to the Archbishop of New York, and again domestic prelate to Pope Leo XIII. In 1895 he was consecrated auxiliary Bishop of New York and titular Bishop of Zeugma. He was promoted to the See of New York in September, 1902, received the special approbation of the Pope in June, 1903, and was made assistant at the Pontifical Throne in December, 1904. In November, 1911, he was one of the three American archbishops to be created cardinal by Pope Pius. Cardinal Farley is an author of some note, having written a valuable *Life of Cardinal McCloskey* and contributed articles to many current magazines.

Farmers' Alliance, a national organization of agriculturists for mutual improvement and furtherance of political ends. It was founded in the State of New York in 1873, for social and educational purposes, but, with the development of other organizations of the same name in various parts of the country, it soon became a political force. In 1890 it reached the height of its popularity and at its national convention of that year declared the following principles of government in its platform: free and unlimited coinage of silver; laws prohibiting speculative dealings in agricultural products; government ownership of all lines of transportation and communication; prohibition of ownership of land by any except American citizens;

and a plan for lending money to farmers on the security of farm products. The membership steadily decreased, however, until in 1895 its remaining followers united with the People's Party.

Farmers' Clubs, local associations of persons interested in questions pertaining to the farm. Meetings are held at regular intervals, and, as generally conducted, consist of a program devoted to papers, talks, etc., interspersed with music and with discussions of the topics of common interest, whether of local or national, scientific or purely practical character. Much influence has been exerted by the most progressive of these clubs in improving methods of farm work, disseminating scientific agricultural education and interesting farmers in public questions not directly connected with their profession. Such clubs are found in nearly all agricultural communities of the United States and have a social as well as educational value. See FARMERS' INSTITUTES.

Farmers' Institutes, a series of meetings for the instruction and help of farmers. In the United States such institutes have been held in all the states and territories except New Mexico, Nevada, Alaska and Hawaii. They consist ordinarily of a two or four days' meeting conducted by directors sent out by the agricultural colleges of the states. Sessions are held morning, afternoon and evening and consist of practical talks upon the line of farm work done in the community where the institute is held, and lectures upon popular subjects. The expense incurred is almost entirely met by appropriations from the state Legislatures. The weak point in the service done by the institutes at present is the failure to see that application is made of the suggestions given from the platform. The growing tendency is to follow up the lectures with practical demonstration of the principles advanced. In 16 states separate institutes have been held for women and systematic instruction given in women's departments of the farm; and a few states, recognizing that many young people in the country leave school at the age of 14, are providing means of organizing them into associations under the direction of institute instructors, who can give them vocational training adapted to their years.

Perhaps one of the most helpful and popular branches of the institute work has been the establishment of institute trains. These trains are equipped with material for illustrating the points of the lectures, and are run at the expense of the railroad companies. They are sidetracked at the different agricultural centers, where farmers have the privilege of examining the exhibits and talking with the instructors in the intervals between sessions of the institute. At present 18 states have at least one such train each and many have two or more.

Farming. See RANCHING.

Fa'roe Islands, a group of islands, lying in the North Atlantic, between the Shetland Islands and Iceland. There are 21 in all, and of the 17 which are inhabited the largest are Strömö, Osterö, Viderö and Vaagö. Their total area is 530 sq. m. Hurricanes prevail and prevent the cultivation of trees and vegetables. Fishing, the rearing of sheep and bird hunting are the chief occupations. The inhabitants are of Norse descent, and the language is a form of old Norse. Population 18,000.

Far'ragut, David Glasgow (1801-1870), an American naval hero, born near Knoxville, Tenn., the son of George Farragut, a native of Minorca. David entered the navy as midshipman when nine and first served under Porter, with whom he went to Valparaiso, Chile. In 1841 he was promoted commander, and from 1854 to 1858 was employed in founding the Mare Island navy yard at San Francisco. At the outbreak of the Civil War he was placed in command of the *Brooklyn,* and in the spring of 1862 he led a naval expedition against New Orleans, the *Hartford* being his flagship. On reaching the Gulf of Mexico he there organized the West Gulf Blockading Squadron, and with able land assistance forced the surrender of New Orleans. Later he captured Baton Rouge and

Natchez, and, by running the batteries at Vicksburg, joined the Union fleet above that place. In consequence of his services at New Orleans he was placed first on the list of proposed admirals. In 1863 he cooperated in attacks on Port Hudson and Vicksburg, and in August, 1864, defeated the Confederate forces in Mobile Bay. His exploits in the Gulf region won him great fame. He received the thanks of Congress and for him the rank of vice-admiral was created. In 1866 he became the first admiral of the United States navy, and, on visiting Europe the following year, was there accorded the highest honors.

Far'rar, Frederick William (1831-1903), an eminent English clergyman, born in Bombay, India. He was educated at the University of London and became assistant master at Harrow in 1855. Later he drew attention by his work as head master of Marlborough College, and became Dean of Canterbury in 1895. He established a reputation as a writer of fiction, biography, history and on religious subjects, while his works, popular in style, tended to elevate religious thought. His chief works are a *Life of Christ* and *The Eternal Hope.*

Fashion. See DRESS.

Fast, a temporary abstinence from food and drink, usually in connection with religion. Fasting as a religious practice has prevailed almost universally; it has been found among the Romans, the Greeks, the Egyptians, the Assyrians, the Aztecs and Toltecs of Mexico, the Incas of Peru and other American aborigines, among the Pacific Islanders, and in eastern Asia wherever Brahmanism and Buddhism have made their way. Fasting among the Israelites was not at first obligatory, but after the Captivity, days of public fasting were established. An orthodox Jew of today fasts on his birthday after he reaches the age of 13, as well as on the birthday of his eldest son, until the latter is 13, besides observing the regular fast days. The period of abstinence is from daybreak until the first three stars appear. In the early Christian Church fasting was a general observance, being required as a preparation for holy acts and feasts and for ordination and baptism. Roman Catholics, generally speaking, abstain from meat on Friday and throughout Lent, besides observing certain other fast days. Fasting is very strictly kept by the Greek Church; their Easter fast covers a period of 48 days, that of Christmas 39. The Church of England recommends fasting as a means of grace, though the observance is not obligatory. The Mohammedans rigorously observe the fast which Mohammed commanded, that during the month of Ramadan.

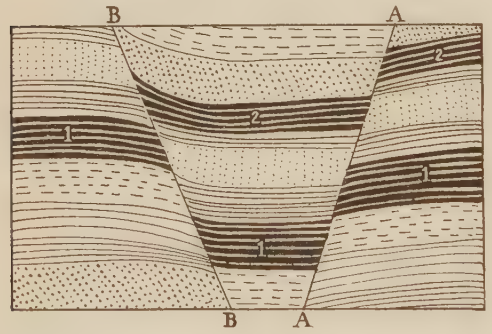
Fata Morgana, *Fah' tah Mor gah' nah,* the name applied to a peculiar kind of mirage, observable in the Straits of Messina between Sicily and southern Italy. It appears in the air, on the water or even in the water and reflects the images of trees, building and people. The name Fata Morgana means fay, or fairy, Morgana. In the legends of King Arthur, Fata Morgana was the sister of Arthur, and in attempting to steal his sword, Excalibur, she secured only the scabbard, which she threw into the sea. She was supposed thus to have caused the mirage in the Straits of Messina; hence the name, which may also be applied to any mirage.

Fates, or **Parcæ,** *Par' se,* in classic mythology, three daughters of Jupiter and Themis (Law) who presided over human destinies. Clotho spins, Lachesis twists and Atropos severs the thread of life.

Fatigue, *Fa teeg',* a condition of the body or of the mind resulting from continued exertion. The form of fatigue most often felt is that due to muscular exercise and nervous strain. Of this sort of fatigue there is a ready consciousness, but some organs of the body may be overworked and the signs of fatigue not be manifest for some time. When the muscles are exercised, certain substances are formed in the muscular tissue, which are poisonous in their effect if not thrown from the system. These poisons are carried off in the blood, but if they accumulate, as the result of contin-

ued exertion, the natural agencies are overtaxed to eliminate them, and serious injuries sometimes result. When the blood of a fatigued person is injected into another, the sense of weariness is transmitted to the second person. If the muscles be overworked, they lose their contractile power and fail to respond readily to the ordinary stimuli. In nervous fatigue the nerves undergo certain physiological changes and lose their sensitiveness. The mind is also affected by fatigue. Some forms of mental fatigue are marked by dullness of perception and feeling, and decreased memorizing and reasoning powers.

Fatigue is nature's warning that it is time to rest. It is, therefore, a protective measure. Every part of the body requires its periods of rest. The muscles of respiration and circulation, while ap-



FAULT

parently perpetually active, have their short periods of rest between each rhythmic movement, when for a brief interval they are absolutely inert. It is during the intervals of rest that the tissues are nourished. Very young persons are prone to overexercise, but they should be prevented from all violent effort which would result in exhaustion. See ATTENTION; SENSATION; WILL; MEMORY.

Fault, in geology, the displacement of strata of rock caused by fracture. In coal beds the extent of a fault varies from a few feet to several hundred, and is sometimes a thousand. The miner determines the location of a lost and displaced stratum by the angle of fracture, or slope of the broken surface. In the illustration the section bounded by the lines A A and B B has been raised from its former position.

Fauns, sportive woodland demigods of the Romans, human in form except for the ears, legs and feet, which were those of a goat. They were similar to the Greek satyrs. It was a peasant custom to sacrifice lambs and kids to them. The name is derived from Faunus.

Faust, *Foust,* or **Faustus, Johann** (about 1485-about 1540), a German astrologer and soothsayer, supposed to have been aided by the Devil in his performance of marvelous deeds. In 1587 the first history of Dr. Faust appeared. This relates how the son of a peasant, after gaining distinction at the University of Wittenberg, seeks to increase his knowledge by resort to magic. Securing the help of a devil, Mephistopheles, who is to be his servant for 24 years, Faust enters upon a course of unrestrained revelry. Awakened to remorse by visions of the spirit world, he turns to mathematics for consolation, but afterwards visits hell and the stars and resumes his revelry. At the end of 24 years he is carried away by the Devil. The story of Faust since its first appearance has been a favorite literary theme. Christopher Marlowe, an English dramatist of the time of Shakespeare, presented it in his *Tragedy of Dr. Faustus,* and among the eminent German writers who have used the story are Friedrich Müller, Lessing, Heine and Goethe, the last of whom gave the world a masterpiece in his drama *Faust.* The opera *Faust,* the music of which was written by Gounod, is also based on this legend.

Faw'cett, Henry (1833-1884), an English statesman and political economist. He attended Cambridge and, having studied law, took up economics, in 1863 becoming professor of political economy at Cambridge. In 1865 and in 1868 he was elected to Parliament for Brighton, and as postmaster-general in the second Gladstone administration he was responsible for many important re-

forms. He strongly advocated free trade. He wrote *A Manual of Political Economy* and *Lectures on the Economic Position of the British Laborer.*

Fawkes, Guy. See GUNPOWDER PLOT.

Fayetteville, N. C., a city and the county seat of Cumberland Co., 60 m. s.w. of Raleigh and about 80 m. n.w. of Wilmington, on the Cape Fear River, at the head of navigation, and on the Atlantic Coast Line, the Raleigh & Southport and other railroads. In the interests of navigation the river channel has been considerably enlarged and improved, and from this stream and its tributaries near the city good water power is derived. The manufactures include silk, cotton goods, flour, lumber, carriages, wagons, woodenware, edge tools, turpentine and cottonseed oil. There is a large vineyard here. At Fayetteville are located a state normal school for negroes and the Donaldson Military School. There are two hospitals, each with a training school for nurses. Fayetteville was settled by Scotch Highlanders in about 1762 and called Campbellton. The name was changed in honor of Lafayette, who visited the place in 1784. At the outbreak of the Civil War the United States arsenal here was seized by the Confederates, and in March, 1865, General Sherman took and destroyed the arsenal and much property. Fayetteville was incorporated in 1893. Population in 1920, 8,877.

Feathers, growths from the skin forming the covering of birds. A typical feather consists of a long, central shaft or stem having on each side a web made up of barbs, from which project many small barbules. The upper and under edges of the barbules have many hairlike projections, usually terminating in minute hooks, which become attached to the edge of the adjoining barbules, thus locking the barbules together and producing a compact web. Many feathers bear a small downy feather, called an aftershaft, which proceeds from the shaft at the base of the web. In a few birds, as the emu, this appendage is nearly as large as the feather itself. The commonest feather is the contour feather, which is usually slightly curved toward the body and has a distinct quill and web. The wing and tail feathers are good examples of this kind. In great contrast to this feather is the long, webless plume of some birds of paradise, the bristles about the mouth of the nighthawk and the tail feathers of the lyre bird. Another kind of feather is found in the down of geese and swans, in which the center shaft is nearly or quite absent, as are also the hooks, the barbules being soft and long.

Feathers grow from definite tracts on the body of the bird, between which there are bare spaces. These tracts differ widely in the various groups of birds, those of a thrush being quite different from those of a woodpecker. Feathers develop from small projections called papillæ, which first appear on the skin of the embryo about the sixth day. From these papillæ the first soft, downy feathers (natal down) of the chick develop, and as the bird becomes older the true feathers grow from the same capsule, the downy feathers being pushed forward, attached to the tip of the new feather, and finally breaking off from the end.

Feathers are an important article of commerce, being used for ornamental purposes, for filling beds and pillows and, in rare instances, for making garments. The demand for brilliantly-colored feathers for millinery purposes has brought several species of birds to the point of extinction. Among these are the white egret, several species of gull, birds of paradise and some species of humming birds. The ostrich has been saved only by the ostrich farms. Formerly the quills of the goose and swan were used for pens, and these birds were bred by the Dutch for their quills, which were exported to all parts of Europe. See BIRDS; PEN.

Feb'ruary, the second month of the year, containing 28 days regularly and 29 each fourth year. February is from the Latin *Februare,* to purify. A festival, Lupercalia, or Februalia, occurred

in the period assigned by Numa to the new month instituted by him to follow January. The month was accordingly named February after the festival. February originally had 29 days, but when the seventh month was named for Augustus, it had only 30 days. This being one day less than July (named after Julius) contained, the Senate decreed to take one day from February and add it to August. See AUGUST; MONTH; YEAR.

Federal Hall, originally the city hall of New York City. It stood in Nassau Street, on the site of the present subtreasury building, and was erected in 1699 to replace the old Dutch *stadt-huys*. When the colonies assumed independence, it was made the state capitol, and before it the Declaration of Independence was read. The first National Congress met in Federal Hall, and on its steps Washington was inaugurated on March 4, 1789. The building was torn down in 1836.

Federalist Party. See POLITICAL PARTIES IN THE UNITED STATES, subhead *Federalist Party*.

Federalist, The, a collection of papers first published in the *Independent Journal* of New York City, and written by James Madison, Alexander Hamilton and John Jay, from October, 1787, until March, 1788. These essays were 85 in number and at first appeared under a joint signature, "A Citizen of New York;" this was later changed to "Publius." The exact authorship is a matter of debate, but to Hamilton belongs the credit for the conception of this effort. The first of these essays appeared directly after the formation of the Constitution, and the principles advocated in them became the rallying cry of the members of a strong, national political organization, who took the name Federalists. This series of essays will always remain indispensable as an introduction to the thorough study of the principles upon which the Federal Government is based.

Federation of Labor, American. See LABOR, AMERICAN FEDERATION OF.

Fee, or **Fief,** *Feef,* a legal term meaning an inheritable estate in land. The term originated in the days of feudalism and referred to an estate held by some lord, in distinction to an estate held by absolute ownership, to which the term *allodium* was applied. In the United States private ownership is termed the fee. The fee simple is an inherited estate belonging to the owner and his heirs and assigns, without restriction. A fee tail is an estate limited to a specified line of descent. Such an estate cannot be disposed of at the will of the owner. See ENTAIL.

Feeble-Minded, Education of the. The first recorded attempts to educate the feeble-minded were made in the 17th century; but were not sufficiently successful to attract general attention under the conditions then existing. The results of efforts begun in 1799 by Itard were communicated to his pupil, Dr. Edouard Seguin, who in 1838 opened a school for idiots in the Paris Hospital for Incurables. Within three years he had accomplished enough to win the approval of the French Academy. Dr. Seguin subsequently removed to New York City, where he was also very successful in this special field. The first serious attempt to interest the American people in this subject was made by Massachusetts, where the Legislature appointed, in 1846, a commission, of which Dr. Samuel G. Howe was made chairman. This commission was charged with the duty of preparing a report concerning the number and condition of idiots in that commonwealth, and the best means of assisting them.

The report, made in 1848, is known as *Dr. Howe's Report on Idiocy*. It resulted in the opening of a state experimental school under the general direction of Dr. Howe; and here such excellent results were attained that in 1851 the Legislature doubled its appropriation and established, in South Boston, the Massachusetts School for Idiots. In this same year New York opened the experimental school which was permanently established in 1853.

Most feeble-minded persons are utterly unable to care for themselves; and since, when outside of institutions, each practically absorbs the time and attention of some one who otherwise might become a productive member of society, it also emphasizes the great expense necessary for their support. In the best institutions, of course, those wholly dependent do not mingle with the others. But those capable of caring for themselves, and of assisting each other, can without injury earn a large part of their subsistence.

In working out a plan of instruction for mental defectives, educators have to recognize that there are degrees of feeble-mindedness. The lowest class includes idiots, who are wholly lacking in the power of attention and self-control. The next class, the simple idiots, includes those whose minds never advance beyond the intellect of the seven-year-old child. Lastly come the imbeciles, who though they are weak-willed and backward in many ways, can be taught to do useful work. None of the imbeciles has a mentality beyond that of the twelve-year-old.

The methods of instruction are similar to those employed in the best kindergartens and primary schools. The brightest of the pupils learn to read and write, and a few are capable of learning numbers as far as multiplication. However, the most beneficial work is of an industrial nature. The girls are taught all lines of housework and also fancy needlework, knitting, crocheting and embroidery. General exercises in music, calisthenics and military drill are used for the purpose of assisting the pupils to control their muscular movements and to work in harmony. Great patience on the part of the teachers is necessary.

Feeh'an, Patrick A. (1829-1902), a Roman Catholic archbishop, born in Ireland and educated at Maynooth College, Kildare. Emigrating to America in 1852, he was ordained priest a few months later, served as professor of moral philosophy and sacred history in the Seminary of Carondelet and in 1865 became Bishop of the See of Nashville. This diocese he was very successful in reorganizing. He also founded the Catholic Knights of America. He was the first Archbishop of Chicago, being appointed in 1880, and during his administration he founded several new parishes, besides a College of Christian Brothers and other organizations.

Feelings. See EMOTIONS.

Feld'spar, an important group of silicates, constituting the principal part of all igneous rocks. Every species of feldspar consists of aluminum in combination with one or more of the following minerals: calcium, barium, potassium and sodium. It forms in crystals, has a glossy luster and is soluble in acids. Feldspar is the chief constituent of gneiss, greenstone, porphyry, and also of granite, to which it gives its color—bluish, greenish, flesh-red and sometimes light gray. It is very hard, though not so hard as quartz; and among the finer grades are moonstones, Labradorites and Amazon stones, which are used as gems. When decomposed it becomes clay. The feldspar of commerce is found in Greenland, New York State, Colorado and British Columbia.

Fel'ony, a term rather loosely applied to crimes of a graver nature than misdemeanors. It may be applied to crimes calling for capital punishment and is so applied in some states, but in most states the distinction between felony and misdemeanor has been abolished.

Felt, a fabric formed by matting together the fibers of wool, hair or fur; moisture, pressure and heat are employed to assist the process. Pliny states that the ancient Gauls made felt so strong that a sword could not pierce through it. The microscope has revealed the structure of hair fiber, showing that it is covered with minute hooks or scales, like those on fish, all pointing in one direction. When the hair has been rolled, worked and pressed, these hooks become fastened together, forming a mat. When subjected alternately to baths of hot and cold water, the fibers shrink, making the mat still finer. Wool is the best fiber for making felt, because of its

wavy or crinkled structure, but all animal hair and fur is used.

The process consists of first carding or combing the fiber into fine sheets the size of the finished web. These are then laid on top of one another; the pile is then pressed between heavy rollers, which are sometimes heated with steam. Then again the material is sometimes immersed in hot and cold water; it is afterwards laid away to dry and becomes felt. This is often fulled, dyed and pressed, the finer qualities being brushed and sheared. Felt is employed in making hats, carpets, rugs, linings, trimmings, mittens, gloves, boots and shoes, in the saddlery and rubber trade, in pianoforte actions, in lining refrigerators and in many fabrics.

Fencing, the art of attack and defense, originally with a sword of one style or another, but later also with the bayonet. The skillful use of the small sword first became common in Italy during the 16th century, and later spread to France and Spain. The rapier has a point but no edge; and its use, therefore, demands great skill and adroitness. The foil, now used in fencing, is like the rapier but is tipped with a button instead of a point, and has a guard of leather or steel over the handle. Fencing affords splendid exercise for those who enjoy its use; but has not been generally adopted as a means of recreation. The bayonet exercise taught to soldiers in the infantry service is also considered a form of fencing.

Fénelon, *Fa"n lon'*, **François de Salignac** (1651-1715), a famous French prelate, educator and author, born in the Province of Périgord. He was educated at the University of Paris; and, after studying theology, was granted holy orders in 1675. In 1678 he was appointed director of a school, then newly organized in Paris, for the instruction of young women. He believed that only as women are educated can moral and social standards be raised in a community. His treatise on *The Education of Girls* was the first systematic work of its kind ever prepared. In 1689 Fénelon was appointed by Louis XIV as preceptor to his grandson, the Duke of Burgundy. For the successful performance of his duties in this position, he was later appointed to the Abbey of St. Valéry, and afterward to an archbishopric; but he is best known as a leader in the movement for the education of women. His publications were numerous and include *Télémaque, The Maxims of the Saints* and *The Temporal Power of the Medieval Popes.*

Fen'ians, an Irish-American revolutionary society, founded in America by John O'Mahony, in 1858. The object of O'Mahony and other leaders of the movement was to form a great league of Irishmen all over the world, united to resist British rule in Ireland. The organ of the league, the *Irish People,* published in Dublin, was suppressed in 1865 by the British Government, and several prominent Fenians were sentenced to penal servitude, but the American organization continued its plotting. In June, 1866, a band of Fenians under John O'Neill invaded Canada, but the raid soon came to an ignominious end. A second invasion of Canada in 1870 likewise failed, this being the last effort of the Fenians.

Fennec, *Fen' nek,* an attractive species of fox and the smallest member of the Dog Family. The true fennec lives in the Sahara and in desert regions of the East, where it digs a deep burrow in the sand and lines it with feathers and down. In this burrow it spends the day hidden from the heat of the desert sun, but it steals forth at night to prey upon jerboas and other desert Rodents. Its fur is generally cream-colored, but the throat, cheeks, eyelids and the ears are marked with white. The face is foxlike, with long, pointed muzzle and erect ears that are far larger than the animal's face. The body and tail together are scarcely more than 20 inches in length and the tail is nearly one-third of this. Like a true desert animal the fennec can go without water for days, but eagerly makes up for this when a stream is found.

Fen'nel, an aromatic herb of the Parsley Family, cultivated in gardens for its fruits and sweet-scented foliage. It is a stout, tall plant, growing to a height of from two to six feet and spreading out thin, dark green leaves which are divided into many tiny leaflets. The flowers are large, round-topped clusters of yellow blossoms, which have no enveloping leaves. The fruit is a flat, oval pod which contains a sweet oil, used medicinally and for seasoning. Fennel, in earlier days, was the emblem of strength and valor.

Fer'dinand, the name of several Holy Roman emperors, of whom the most important were Ferdinand I and Ferdinand II.

FERDINAND I (1503-1564) was the son of Philip of Austria and the younger brother of Charles V of Germany. When Charles ascended the imperial throne he transferred his right to the Hapsburg Austrian possessions to Ferdinand. In 1521 he married the sister of Louis, King of Hungary and Bohemia, and when, five years later, Louis died childless, Ferdinand claimed the crown of Hungary in his wife's name. At the same time he was elected King of Bohemia. Though not without rivals, he succeeded in holding his ground and later was also made King of the Germans. Upon the abdication of Charles V in 1556, Ferdinand ascended the throne of the Holy Roman Empire and, though not recognized by the reigning pope, was not opposed by the succeeding pontiff. Ferdinand I accomplished many reforms and was a wise and progressive ruler. He instituted the present system of currency in Germany.

FERDINAND II (1578-1637) was Holy Roman emperor from 1619 to 1637, and was the grandson of Ferdinand I. His education made him an ardent Catholic, and, when he succeeded his father as Duke of Styria, Carinthia and Carniola, he made every effort to stamp out Protestantism in his domains. To protect Catholic interests he formed with Maximilian the Catholic League. He was elected King of Bohemia in 1617 and of Hungary in 1618, and his intolerance toward his Protestant subjects there brought on the Thirty Years' War. In 1619, upon the death of Matthias, Ferdinand became Holy Roman emperor, although two days before his accession he was deposed from the throne of Bohemia. His successor in Bohemia was, however, quickly removed by the army of the Catholic League under Tilly. With his able generals, Wallenstein and Tilly, Ferdinand made the Catholic cause triumphant in Denmark and Germany. Gustavus Adolphus, King of Sweden, became the able champion of the Protestant cause and defeated Tilly in two great encounters, which left the Protestant army almost the masters of Germany. Wallenstein, who had been in disgrace, was reinstated and succeeded in staying the advance of the Swedish forces. Ferdinand, however, became suspicious of Wallenstein and connived at his assassination. Ferdinand's own death three years later came before the close of the conflict and left to his son the continuation of the war.

Ferdinand V of Castile (Ferdinand II of Aragon) (1452-1516), called the Catholic, son of John II of Aragon. He was married to Isabella, sister of Henry IV of Castile, in 1469, and five years later Ferdinand and Isabella were crowned joint sovereigns of Leon and Castile. In 1479 Ferdinand became King of Aragon through the death of his father. Ferdinand's reign was of importance through the uniting of the Spanish states, the suppression of the banditti and the lowering of the power of the feudal lords. The reign of the two sovereigns is marked by the discovery of the New World in 1492 and the entrance of Ferdinand and Isabella into Granada. This last event proved the final act in breaking up the Moorish domination of Spain. The following year occurred the expulsion of the Jews from the Spanish Peninsula. Isabella died in 1504 and two years later Ferdinand married the niece of Louis XII of France. Successful in uniting his own lands, he also added to them various fortresses of

northern Africa and much of the Kingdom of Navarre.

Fer'gus Falls, Minn., a city and the county seat of Otter Tail Co., 170 m. n.w. of Minneapolis, on the Red River and on the Great Northern, the Northern Pacific and other railroads. The city is situated in the celebrated "park region" of the state, famous for its beautiful scenery. It is surrounded by productive agricultural lands and valuable forests of pine and hard wood; and it has exceptional water-power facilities. The chief manufactured product is flour. Other factory products are lumber, iron, furniture, brooms, wagons, sleighs, caskets, woodenware, sashes, doors, blinds, woolen goods and shirts. There are also in the town foundries, machine shops and a meat-packing plant. Fergus Falls is the seat of a state hospital for the insane, of the Park Region Luther College (Norwegian Lutheran) and of the North-Western College (Swedish Lutheran). Other features of the city are a public library, a business college, a county courthouse, a city hall, St. Luke's Hospital and the G. B. Wright Memorial Hospital. Settled about 1859, the place was incorporated in 1863 and chartered as a city in 1883. Population in 1920, U. S. Census, 7,581.

Fer'ment, an agent capable of producing in animal and vegetable products, certain chemical changes. Ferments have been classed as organized ferments and unorganized ferments, or enzymes. The former are living organisms, such as yeast, bacteria and molds. It is now thought that their action is due to the production of an enzyme. The unorganized ferments, or enzymes, are supposed to be complex carbon compounds whose compositions and properties are not well known. They are soluble in water but not in alcohol. Some authorities claim that the enzymes are merely properties of the organized ferments, but this theory does not commonly prevail.

The ferments which take part in digestion in the body are enzymes, and are ptyalin, in the saliva; pepsin and rennin, in the gastric juice; and steapsin, trypsin and amylopsin in the intestinal juices.

Fer"menta'tion, technically any chemical change which is accompanied by effervescence, but the term is broadened to include the change of any organic substance by means of ferments. Such a change takes place in the presence or with the aid of moisture and generally results in the breaking up of a complex compound into simpler ones. Each ferment has a certain temperature, ordinarily high, below which it will not act. Alcoholic fermentation takes place wherever yeast, or any bacterium, breaks up sugar or starch into alcohol and carbon dioxide. Other fermentations occur in the souring of milk, in the ripening of cheese and, in the body, in the processes of digestion. See FERMENT; YEAST.

Fernan'do Po, an island in the Bight of Biafra, about 20 m. off the west coast of Africa. It is 40 m. long, 20 m. wide and has an area of 770 sq. m. Its origin is volcanic, and the mountainous surface rises to its highest elevation of 9300 ft. The extreme heat makes the climate unhealthful; the fertile and well-watered soil yields rice, corn, bananas and yams. It was discovered by Fernando Po near the end of the 15th century. The population, consisting mainly of Portuguese and native negroes, exceeds 20,000.

Ferns, a name given to a number of plants classed together in the Fern Family, and known as the chief group of flowerless plants. They vary in size from the giant tree ferns of the tropics to the delicate cliff spleenworts. In general they are stemless or hollow-stemmed and have leafy, spreading fronds. In the spring, when first coming up, the distinct leaves are rolled close to the stem and the stem is curled like the top of a bishop's crozier. As the stems lengthen the heads unroll until they are widespread. The leaves commonly bear upon their under surfaces the round, brownish spore cases, in which are countless, tiny spores by means of which the plant is to be reproduced. These spore cases differ in size, shape and location according to the species to which the ferns be-

long. When the spores are ripe the case opens and the spores are scattered far and wide. Those which fall in favorable locations develop into a peculiar, hairlike body, very unlike the fern which produced it. Later, through an intricate course of growth, the fern is developed from this body.

TYPES OF FERNS

The ferns are outwardly widely differing plants but are grouped together mainly through their mode of reproduction. As house plants, conservatory plants or inhabitants of the woodland, they are extremely decorative. The chief varieties are: the asparagus fern, a potted fern whose leaves are reduced to tiny spines; the brake, a coarse fern, discussed under that title elsewhere; the polypodium, a blunt-toothed fern which loves the seemingly bare walls of rocks; the dicksonia, lady, and New York ferns, whose long plumelike fronds make the moist wood beautiful; the maidenhair fern and the spleenworts, which are delicate plants, generally bearing but one leaf. The largest ferns known now are the tree ferns of warm climates, which may be large, palmlike trees with unbranched stems and waving fronds, or smaller, more delicate plants scarcely more than three feet in height.

Ferrara, *Fer rah' rah,* a city of northern Italy in the Province of Emilia, 26 m. ne. of Bologna and not far from the banks of the Po. Though still the capital of its district, Ferrara has little of the glory that it possessed when it was the seat of the dukes of Este, and when their magnificent court vied with any of Italy. The old Castello in the middle of the city, once the residence of the dukes, is now occupied as a city bureau. The great cathedral remains, though sunken into decay, and there are numerous other churches and galleries of famous paintings. The home of Ariosto and the cell in which Tasso was imprisoned are objects of great interest. The city still carries on a trade in grain, fruit, cattle and wine, and manufactures soap, wax, glass, stoves and utensils of brass. At one time Ferrara was famous for its school of painting, and in 1438 it was the meeting place of the Council of Ferrara-Florence. In the 16th century the city was the refuge of Calvin, Marot and others. A free university, established there in 1391, enrolls 490 students. Population, 33,000.

Ferrero, *Fer ra' ro,* **Guglielmo** (1871-), an Italian historian, born at Portici, near Naples. He was educated at Pisa and Bologna, and in 1896 published a collection of social and political studies under the title *Young Europe.* In 1902 appeared the first volume of his celebrated history, *The Greatness and Decline of Rome.* He has also written

The Women of the Cæsars. He has lectured in France and in several cities in the United States.

Fer'ret, a small, active animal of the Weasel Family, by some supposed to be only an albino polecat, and, like all weasels, having a distinctive, unpleasant odor. The ferret was brought from Africa to the United States because of its value as a Rodent destroyer, and its zeal in killing mice, rabbits, chickens or even turkeys and geese is unbounded. Sometimes it does more harm than good. It has a pointed head, reddish eyes and small ears; its body is long and slender, its legs short, with sharp, strong claws; the tail short and furry. The ferret can be domesticated sufficiently to be of assistance in ridding mills, factories, granaries and farms of rats, mice and rabbits, but it can never be fully tamed. A black-footed ferret, known in the regions of the Platte River, has a black mask, a black saddle and black spots upon its feet and tail.

Fer'ry, a boat for the transportation of freight or passengers, or both, across a relatively narrow body of water. On small streams the boat is often only a rude scow, propelled by oars or poles, or by means of a cable or chain, stretched from shore to shore. Launches of various kinds and steam ferries have now replaced the more primitive ferries, wherever the business is sufficient to justify. Passenger ferries at cities like San Francisco or New York are licensed to carry several thousand persons. Railroad ferries are used for transporting cars across bodies of water. Some of these are large enough to take on board an entire train of freight or passenger cars.

Fer'tili"zer, a commercial manure used to enrich soil and to increase the yield of crops. To be of value it must contain the elements that the soil lacks to render it fertile; these are usually nitrogen, potash and phosphoric acid, and the different fertilizers contain these in varying quantities in order to be available for different soils. Usually sandy soils need all three of these; clay needs nitrogen, limestone needs potash and nitrogen, and black soils lack potash and phosphoric acid. The best test as to what a soil needs is to grow a crop upon it and watch the results.

Nitrogenous fertilizers promote the growth of stems and leaves. The most common of these upon the market are Chile saltpeter, sulphate of ammonia, dried blood, azotin, tankage and fish guano. The phosphates are bones, rock phosphates, or floats, superphosphates and Thomas slag; these phosphates may be applied at any time, as they are not easily washed out. Potash fertilizers produce starch in plants; since they are easily soluble they are generally applied broadcast and then harrowed in. The most common kinds are muriate of potash, sulphate of potash, nitrate of potash, wood ashes, cottonseed hull ashes and ground tobacco stems and leaves. The latter is also of value as an insecticide.

Since no soils require exactly the same treatment, many farmers prefer to mix the fertilizers themselves, thus buying only the constituents which their soils lack. Directions for this and discussions of the various fertilizers upon the market may be found in the *United States Department of Agriculture Farmers' Bulletin 44; New York Experiment Station Bulletin 94;* Voorhees, *Fertilizers;* Bailey, *Cyclopedia of American Agriculture.* See MANURE.

Fess'enden, William Pitt (1806-1869), United States senator, born at Boscawen, N. H. He graduated at Bowdoin College in 1823, studied law, was admitted to the bar in 1827, and began practice in Maine. In 1832 he became a member of the Maine Legislature, serving several terms, and was elected to Congress in 1840, where he remained one term. He became prominent as an anti-slavery speaker, was elected United States senator in 1854, opposed the Kansas-Nebraska Bill in a remarkable speech, and became one of the recognized anti-slavery leaders in Congress. During the war he was the most conspicuous senator in sustaining the national credit, and in the words of

Mr. Sumner, "was in the financial field all that our best generals were in arms." He was made secretary of the treasury in 1864 and immediately issued a popular loan to relieve the financial situation. Having accomplished his purpose, he returned to the Senate in 1865, where he was made chairman of the finance committee, and the joint committee on reconstruction. He opposed the impeachment of President Johnson and was one of the seven Republican senators who voted for his acquittal.

Fes'tivals, or **Feasts,** celebrations in honor of some personage or to commemorate some great event. The chief festivals of the Jews were the Pentecost, Passover and Feast of Tabernacles, attendance on these being required of all males. The Greeks celebrated the Dionysia, the Eleusinia and the Olympian, Isthmian, Nemean and Pythian games, besides various local festivals. Among the Roman feasts, the Saturnalia, Cerealia and Lupercalia were important. Sunday, the survival of the Hebrew Sabbath, is the only day observed by all branches of the Christian Church, but the Roman Catholic and Anglican churches celebrate many days or periods commemorative of events in the life of Christ.

Feu'dal System, a political and social condition which has existed in many countries. The fundamental principle was that land or a fief was received by a vassal from his lord, the vassal promising fealty and certain stated aids, while the lord promised to protect the vassal in his possession of the land. The system in Europe had certain Teutonic and Roman elements, and grew out of the turbulent state of society after the fall of the Roman Empire. It was an attempt to maintain some sort of unity against foreign invasions, without the protection of a central authority. The invaders adopted the system, as the chief of a conquering band rewarded his comrades by grants of land according to feudal tenure. It was further extended by the custom of "commendation," or the voluntary giving up of land by a freeman to some powerful chief who gave back the land as a fief and promised to protect his new vassal.

After a while the fief became hereditary, and the system permeated all ranks until theoretically the land all belonged to the king. Practically, the feudal system was built on force, and every petty lordling felt free to make war, administer justice and in other ways to act like an independent king. The system was very complicated, as the terms of contract and the services required varied with each fief, and a man might find himself lord and vassal to the same man for different fiefs.

Feudalism attained its most complete development in Europe in the 11th, 12th and 13th centuries, where it rendered good service to civilization by the protection it gave to society after the empire of Charlemagne was divided. Chief among the causes which finally overthrew the system were the hostility of the kings and common people, and the weakening of the power of the nobles, the latter resulting from the Crusades, the growth of cities and the introduction of firearms in war. See CHIVALRY.

Fe'ver, a condition in which the temperature of the body is above normal. It occurs during disease and is usually accompanied by pains in the head, back or limbs, general weakness and rapid pulse, always by dry, parched skin. The term is also applied to certain bacterial diseases, in which high temperatures are a conspicuous symptom, such as malarial fever, yellow fever, scarlet fever and typhoid fever. Fever is usually marked by three principal stages. The first is the period of invasion, the symptoms of which are a feeling of weakness, loss of appetite, lassitude, chilly sensations, pain in the back and limbs and rapid pulse. Following this is the period of domination, characterized by continued, rapid pulse, hot surface, high temperature, headache, thirst, rapid breathing and restlessness. With the period of decline comes a fall of temperature, cessation of pain, perspiration, easier respiration and sleep.

Fever which remains above the normal

(98.4° F.) for several days is called continued fever; when the temperature drops to normal and after a few hours rises again, it is termed intermittent; if the fever rises and falls between points above normal and continues in this way for several days, it is called remittent. In relapsing fever the temperature goes down to normal, remains several days and then rises. In addition to those diseases caused by the presence of bacteria in the system, other causes of fever, such as local inflammation, are numerous. In treating fever, the body should be sponged often with cold water to reduce the temperature, and the patient should not be allowed to drink too much water. Fever is regarded as high when it rises four degrees above the normal; when it reaches 105 degrees, it become dangerous.

Fe'verfew, a low weed of the Composite Family, once brought here as a garden plant. Even now people admiring the golden beauty of the blossoms in the summer often transplant the weed to their lawns and gardens, only to find that they have brought in an intruder which spreads rapidly and is extremely hard to eradicate. The stems are erect, about one to three feet in height, and bear coarse leaves which are composed of rough, oval leaflets. The flowers are much like those of its close cousin, the ox-eye daisy, except that those of the feverfew grow in larger clusters and are apt to be double-flowered. Each blossom is a flat, disklike head of yellow or white florets surrounded by one or more rows of flat, white rays. In a mass these flowers are lovely, and, as they last long after picking, they are favorites for porch decoration or clustered bouquets.

Fez, one of the two capitals of Morocco, situated on the Wad Fās River, which divides the town into the old and new parts. The streets are gloomy and damp and the drainage system is poor. The Karueein is the largest mosque in Africa; there are also several other mosques and the sultan's palace, which is partly in ruins. Caravans bring a large amount of wares from the South and East, and Fez is an important commercial center. The manufactures include the famous Fez cap, dyed to a dull crimson with the juice of a berry growing near the town, yellow slippers of Morocco leather, sashes, silk cords and handkerchiefs, carpets and pottery. It is still the "university town" of Morocco, and as a seat of learning was once the empire's pride. The city was founded about 808. Population, estimated at less than 100,000.

Fezzan, *Fez"zahn',* a country of northern Africa forming the southern portion of the Province of Tripoli. It has an area of about 130,000 sq. m., and physically may be divided into two differing regions: the northern, covered by barren mountains; the southern, consisting of desert broken by many small oases. In the oases, dates, barley, maize, melons, pomegranates, figs, legumes and some vegetables are raised. Dates are, however, the chief article of food. There are almost no streams, and in some parts rain does not fall for years. The city of Murzuk, the capital, is said to be the hottest place in the world in the summer, but the extremes of temperature are great and the cold in winter is likely to be severe. The natives of Fezzan are of mixed race; they are governed by a chief, who has the title and powers of Sultan in his own territory, but who pays tribute to the viceroy of Tripoli. The population of Fezzan is variously estimated between 50,000 and 150,000.

Fi'at Money, the term applied to paper money issued by a government and secured only by the credit of that government. Such money does not even contain a promise to pay. No fiat money has been in use in the United States since the passage of the gold standard law of 1900, and none is used by any other great commercial people. That issued to a considerable extent in early days by the American colonies was soon recognized as worthless. The paper money now used in the United States is in circulation largely because it is lighter to carry; and because its use saves that loss to the nation which would result

from abrasion, if gold, or even silver, were more generally carried. See MONEY, subhead *Paper Money;* CONTINENTAL MONEY.

Fichte, *Fik' te,* **Johann Gottlieb** (1762-1814), a celebrated German philosopher, born at Rammenau, in Upper Lusatia, the son of a ribbon weaver. A neighboring nobleman helped him to get an education. He studied theology and philosophy at Jena and Leipsic, and did private tutoring in Saxony and at Zürich, Leipsic and Warsaw. In 1791 he went to Königsberg, where he made the acquaintance of Kant. The next year he published his *Critique of all Revelation,* which attracted much attention and resulted in his appointment in 1793 to the chair of philosophy at the University of Jena. Relinquishing this position five years later because of heresy charges, he went to Berlin, where he taught privately for a number of years and delivered philosophical addresses to distinguished audiences. He became professor of philosophy at Erlangen in 1805. In the winter of 1807-8, with the French in possession of Berlin, he delivered there his famous *Patriotic Addresses to the German People,* which aroused great enthusiasm. In 1809 he became professor of philosophy in the new University of Berlin which he had helped to found, and the next year was chosen its rector, continuing in this position until his death.

Starting with Kant's philosophy, Fichte emphasizes the primacy of the practical reasoning, rather than the theoretical. He reduces Kant's "things in themselves" to an empty shadow, and makes the Ego supreme. Complete subjective idealism is the result. In education he emphasizes the importance of the whole nature, moral and religious as well as intellectual. His addresses, writings and teaching exerted a powerful influence upon Germany at a critical period in its history.

Fic'tion, that species of literature which treats of imaginary events, situations and characters. In the course of its development it has included both prose and poetry, but as used today, the term *fiction* is generally applied to prose narratives. Tattered manuscripts recovered from ancient Egyptian tombs tell us that the art of fiction was known to the dwellers on the Nile as early as 4000 B. C. The Hindus, Chinese, Persians and Arabians had their treasures of fiction, and from the Arabian came the greatest collection of tales of magic the world has ever known. The Greeks also made their contribution to fiction, not only in their myths and epics, but in the prose tales of adventures which belong to the period when Alexandria was the center of culture. The Romans originated practically nothing in fiction, but their language became the chief medium through which ancient fiction was transmitted to the new European nations.

During the Middle Ages romances of chivalry dealing with such figures as Charlemagne and King Arthur were very popular. In Chaucer's *Canterbury Tales* we find a variety of typical medieval forms: the romance of chivalry, the Oriental tale, the story of intrigue and the beast fable. In Italy short prose stories like those found in Boccaccio's *Decameron* were popular. These were called *novelle,* from which we derive our word *novel.* Medieval fiction is interesting as the foundation upon which modern fiction is built. Prominent types of fiction read today are the novel, fable, parable, allegory and fairy tale.

THE NOVEL. The novel, according to modern theories, is a prose narrative containing a plot and giving a faithful portrayal of character amid scenes of actual life. The love element is also a characteristic of almost every novel. The first story fulfilling all of these requirements was *Pamela,* the work of an obscure London printer named Samuel Richardson, which was produced in 1740. Earlier than this, Bunyan and Defoe had written continuous narratives and Addison and Steele had given very realistic pictures of English life and skillful character portrayal, but Richardson was the first to write a continuous narrative with a definite plot. After the formula for the novel had been given, its devel-

opment was assured, both in England and in Continental Europe. For the last two centuries this form of literature has occupied a very prominent place in English letters, and it has developed steadily through the immediate successors of Richardson: Fielding, Smollett, Sterne and Goldsmith; and the greater 19th century writers: Scott, Jane Austen, Dickens, Thackeray, George Eliot, Meredith and others. In the course of its development the novel has had a remarkable broadening of scope and a corresponding increase of power for good or evil.

THE FABLE. The fable is a form of fictitious narrative in which animals and sometimes inanimate objects are made to act and speak as human beings, for the purpose of imparting a moral teaching. It is brief and definite. In its origin the fable goes back to remote antiquity. The oldest fables which we possess in the original form came from Hindustan. From there they passed to China, Tibet and Persia, then to Greece. The most famous Greek fabulist was Æsop (620-560 B. C.), though whether or not his fables were written down is a matter of dispute. Of the early Latin versions of the *Fables* the most celebrated is that of Phædrus, a freedman of Augustus. Maximus Planudes, a monk of the 14th century, made and edited the collection which has come down to us under the name of Æsop. Lessing was the best of the German fable writers. In the 17th century Gay in England and La Fontaine in France won distinction. The latter has the first place among fabulists.

THE PARABLE. The parable, like the fable, is of Eastern origin and is also brief and designed to point a moral. It differs from the fable in that animals or inanimate creatures do not lose their natural characteristics. The most notable parables are those of the Bible. Nathan's story of the ewe lamb is one of the best in the Old Testament. *The Prodigal Son* is a typical parable of the New Testament.

THE ALLEGORY. In literature an allegory is a narrative, in prose or verse, conveying a meaning other than and in addition to the literal. The fable or parable is a brief and simple form of the allegory. Many allegorical passages occur in the Bible, one of the most effective being in the 80th Psalm, the comparison of the history of Israel to the growth of a vine. English literature is rich in allegorical productions. Conspicuous examples are Swift's *Tale of a Tub,* Bunyan's *Pilgrim's Progress* and Hawthorne's *Great Stone Face.*

THE FAIRY TALE. The fairy tale is a story in which supernatural beings and agencies occur, and which is especially interesting to children. Most of our popular fairy tales have been handed down orally, the earliest collection of European tales having been published in Venice in 1550. The well-known stories, *Little Red Riding Hood, Bluebeard, Puss in Boots, Cinderella* and *Hop o' My Thumb,* date from 1697. Jacob and Wilhelm Grimm and their successors have put in written form the tales of nearly all nations. The best modern fairy tales are those written by Hans Christian Andersen. See ANDERSEN, HANS CHRISTIAN.

Field, Cyrus West (1819-1892), the promoter of the Atlantic cable, born in Stockbridge, Mass. He went to New York City at the age of 15, where he secured employment in a dry-goods store. Engaging later in the manufacture and sale of paper, he built up a prosperous business. In 1853 he partially retired and traveled extensively in South America. He obtained a charter giving him the exclusive right for 50 years to land ocean telegraphs on the coast of Newfoundland, and organized an Atlantic telegraph company. To this project of trans-Atlantic communication he devoted many years of his life, making several unsuccessful attempts to lay a cable, establishing communication between the two continents in 1858, only to be broken after a few weeks, and finally achieving permanent success in 1866. Congress voted unanimously to present Field a gold medal, and he received various dec-

orations from European countries. Later he became interested in the construction of elevated roads in New York City and in establishing telegraphic communication with the West Indies and South America. See CABLE, SUBMARINE.

Field, Eugene (1850-1895), American poet and journalist, born in St. Louis, Mo. He was educated in Eastern schools and also at the University of Missouri. At college, his genial ways and cleverness in originating fun made him a general favorite. Field began newspaper work at the age of 23, and in 1883 became associated with the Chicago *News,* afterwards the *Record,* editing a humorous column called *Sharps and Flats.* During his residence in Chicago he became the leading spirit of the "Saints and Sinners Corner," a group of book-lovers who used to meet in the rare-book department of McClurg's bookstore. Field was accustomed to report the sayings of the "saints and sinners" in his column, one of the many ways he had of getting "copy." He was a man of varied tastes and powers of expression, capable of writing both prose and verse in a manner that was by turns quaint, farcical, grotesque, sentimental, pathetic, humorous and tender. His great love for children occasioned much of the poetry by which he is best known; his child verse, of which *Little Boy Blue* is the favorite poem, is unexcelled in simple tenderness. Field's fondness for books inspired some of his most admirable work, notably his translation from Horace, *Echoes from the Sabine Farm,* and *The Love Affairs of a Bibliomaniac. With Trumpet and Drum* contains his best verses for children. Other writings are *Love Songs of Childhood, Culture's Garden, A Little Book of Western Verse* and *A Little Book of Profitable Tales.*

Field, Marshall (1835-1906), an American merchant, born at Conway, Mass. His early years were spent on a farm. When he was 17 years of age he went to Pittsfield, Mass., and began clerking in a dry-goods store. In 1856 he went to Chicago and formed a partnership for carrying on the dry-goods business. In 1865 Marshall Field, Potter Palmer and L. Z. Leiter were partners. On the retirement of two partners, Mr. Field became the head of the organization known since 1881 as Marshall Field & Company, which, during the first quarter century of its existence, grew to be the largest dry-goods house in the world. Mr. Field contributed liberally to the University of Chicago, founded the Columbian Museum and willed to it about $8,000,000. He was a director of the United States Steel Corporation, the Pullman Company, the Chicago & North Western Railway Company and many other corporations. At his death he was one of the wealthiest men in the world.

Field, Stephen Johnson (1816-1899), an American jurist, brother of Cyrus W. and David Dudley Field, born in Haddam, Conn. He graduated at Williams College in 1837, studied law in his brother's office in New York, and became his partner when admitted to the bar. In 1849 he went to California, and exercised a salutary influence during the unorganized gold-seeking period, meanwhile gaining an extensive practice. He served in the first Legislature of the state after its admission to the Union, and was elected a justice of the State Supreme Court in 1857, becoming chief justice two years later. President Lincoln appointed him to the Supreme Bench of the United States in 1863 and he served for 34 years with great ability. He wrote a total of 1042 opinions, many of them being important contributions to American constitutional law.

Field Glass, a small, portable, double telescope for observing distant objects. It is an enlarged opera glass (See OPERA GLASS). An achromatic telescope, having a length of from 15 to 30 inches, is also designated a field glass. See TELESCOPE.

Fielding, Henry (1707-1754), an English novelist, born in Sharpham Park, Somersetshire. He studied at Eton and Leyden and after going to London turned his attention to writing for the stage. His comedies and farces were

not a decided success, though many of them were entertaining burlesques, and he returned to the profession of law. After his marriage with Miss Cradock, whose fortune he soon squandered, he began to write again for his living, and in 1742 appeared his first novel, *Joseph Andrews.* Seven years later he published *The History of Tom Jones, a Foundling.* In his hands the novel attained the form that has since been an ideal of all novelists, and in its large outlines and practical presentation of life it far surpassed the sentimental analysis of his contemporary, Richardson. Fielding's realism was sordid for he drew life exactly as he saw it, but it was enlivened with humor and ridicule and a sympathy for human frailties such as few authors have possessed. Among his other works are *Jonathan Wild, Amelia, Author's Farce, Tom Thumb* and *Temple Beau.* See RICHARDSON, SAMUEL.

Fielding, William Stevens (1848-), a Canadian statesman, born in Halifax, Nova Scotia. In 1864 he joined the *Morning Chronicle,* of which he ultimately became managing editor, retiring from journalism, however, in 1884. As a Liberal he sat for County Halifax (local) from 1882 to 1896, meanwhile declining the premiership of Nova Scotia, but serving as provincial secretary. Since 1896 he has sat for Shelburne and Queen's (House of Commons) and was minister of finance in the Laurier administration, holding his position longer than any other finance minister and being always able to report a surplus, but retiring in October, 1911. The embodiment of imperialism, he has been responsible for such measures as amendments to the Banking and Insurance Acts, the British preferential tariff and the agreement to construct the National Transcontinental Railway. Moreover, he has negotiated with France relative to a trade treaty between that country and Canada, was a royal commissioner for promoting mutual trading facilities between Canada and the British West Indies and has recently discussed reciprocity at Washington. At various times he invited Marconi to experiment with wireless telegraphy in Canada, established a branch of the Royal Mint at Ottawa and introduced the Penny Bank into Canada. Mr. Fielding, who is probably the greatest finance minister that his country ever had, declined knighthood in 1902.

Field Marshal, the highest military office in Germany, Great Britain and other European countries. The office is of German origin, and in 1736 was introduced into the army of Great Britain by George II. Promotion is from the rank of general officers and on the ground of royal descent or distinguished services. It is made by royal selection.

Field of the Cloth of Gold, the name given to a plain lying between Ardres and Guisnes in the Department of Pas-de-Calais in France. The splendor of the banquets and the rich dress and trappings used at the place during the meeting of Francis I of France and Henry VIII of England, from June 7 to 20, 1520, gave the field its name. Francis I failed in the object of the meeting, which was to secure the help of Henry VIII against his rival, Charles V. See CHARLES V.

Fields, James Thomas (1817-1881), an American author and publisher, born in Portsmouth, N. H. In 1839 he became a member of the publishing firm of Ticknor, Reed & Fields, of Boston, and here his charming personality, generosity and excellent literary judgment gained for him the friendship of a large number of American writers. He was the publisher of Longfellow, Hawthorne, Emerson, Holmes, Whittier and Lowell. From 1862 to 1870 he was the editor of the *Atlantic Monthly,* spending the last ten years of his life in authorship and lecturing. His works include *Yesterdays with Authors, In and Out of Doors with Charles Dickens, Underbrush* and *A Few Verses for a Few Friends.*

Fife, a small, shrill-toned wind instrument resembling the flute, usually in the key of F or B flat, used principally in military music to accompany the drum. See FLUTE.

Fifteen Decisive Battles. Sir Edward Creasy in *The Fifteen Decisive Battles of the World* has chosen and described the following battles as the most influential in deciding the progress of man:

1. MARATHON (490 B. C.). The Athenians under Miltiades defeated the Persians sent by Darius and saved Europe from the stagnation of Asia (See MARATHON, BATTLE OF).

2. SYRACUSE (413 B. C.). The Athenians were defeated and Greek advance in the West was checked.

3. ARBELA (331 B. C.). Alexander won his final victory over Darius and spread Greek culture and learning throughout the Persian Empire (See ARBELA, BATTLE OF).

4. METAURUS (207 B. C.). In this battle Hannibal failed to receive reinforcements and the final defeat of Carthage was decided.

5. TEUTOBERG FOREST (9 A. D.). The German, Arminius, defeated the Romans under Varus and thus the boundaries of the Roman Empire were fixed.

6. CHÂLONS (451). The united Roman and Gothic forces defeated Attila and saved Europe from the barbarous Huns.

7. TOURS (732). Charles Martel conquered the Saracens and saved Europe from a Mohammedan invasion (See TOURS, BATTLE OF).

8. HASTINGS (1066). William the Conqueror defeated Harold and brought England into closer touch with the civilization of the Continent (See HASTINGS, BATTLE OF).

9. ORLÉANS (1429). Joan of Arc drove the English from before the town and turned the tide of the Hundred Years' War.

10. ARMADA, THE (1588). Philip II of Spain failed in his attempt to invade England; hence England was saved for Protestantism (See SPANISH ARMADA, THE).

11. BLENHEIM (1704). The Duke of Marlborough and Prince Eugène of Savoy checked the encroachments of Louis XIV.

12. POLTAVA (1709). Peter the Great defeated Charles XII of Sweden and brought Russia in touch with the civilization of Europe.

13. SARATOGA (1777). General Gates commanding the Americans defeated the English under Burgoyne. This led France to espouse the American side, and turned the tide in favor of the colonists (See SARATOGA, BATTLES OF).

14. VALMY (1792). The French won against the allies gathered under the Duke of Brunswick, and the reforms of the French Revolution were assured.

15. WATERLOO (1815). Napoleon I was overcome by the allied armies under the Duke of Wellington (See WATERLOO, BATTLE OF).

Fifty-four Forty or Fight, in United States history the slogan of the Democratic Party in 1844. By the treaty of 1819 Spain surrendered its claim to territory north of parallel 42° and in 1825 Russia and the United States agreed to 54° 40′ as the boundary line between their possessions. The country between these lines, known as Oregon, was occupied jointly by the United States and Great Britain, but as fur traders of the two countries began to compete with each other and pioneers began to make settlements the question of the boundary line came into prominence. The Democrats in the campaign of 1844 demanded the reoccupation of Oregon, declaring that American title to all territory as far as 54° 40′ was clear and not disputable. In 1846, however, Great Britain and the United States entered into a treaty which fixed the 49th parallel as the boundary line.

Fig, a name given to a large group of plants of the Breadfruit Family, among the best known of which is the tree which produces the fig of commerce There are over 100 species known, many of which are held in veneration by Orientals; chief among these are: the Bo, or Sacred Fig, under which Gautama, afterwards the Buddha, is said to have rested for 40 days; the peepul, or religious fig; and the banyan. These different species are decidedly different in

form and may be vines, shrubs or trees. In general, however, they are characterized by having a milky, biting juice, which is often used in making a green dye, and hard rough leaves which are used in polishing wood and ivory. The fiber of the bark is tough and may be twisted into cordage for net making.

The common fig, which produces the fig of commerce, is a native of India, but is common in all tropical countries and is grown in parts of the British Isles, France and the United States. This is a low tree, rarely growing more than 15 or 20 ft. in height. Its leaves, which are not evergreen, are deeply lobed. The fruit, which grows singly in the joints of the leafstalks, is pear-shaped

FIG

and may be blue-black, red, yellow or green in color. This edible portion, commonly called the fruit, is really only an enlarged receptacle within which the flowers grow. In the illustration 1 shows the fruit on the branch and 2 is a vertical section showing the position of the flowers and seeds. On account of their concealed position, the flowers which on one tree are all pistillate (that is, containing the undeveloped fruit) are not easily fertilized, and much difficulty has attended the cultivation of the fruit. The receptacle, which will enlarge and become sweet without the maturing of the seed, was found to be of much poorer quality in the unfertilized than in the fertilized fruit. This fact led to experiments by the United States Department of Agriculture, which brought out some interesting facts in regard to fig culture. The Smyrna fig trees, which bear the best-flavored fruit, were found to produce only pistillate flowers, while the caprifig, or wild fig, bears both pistillate and staminate flowers, the latter containing the fertilizing dust. These caprifigs are also the home of a small insect called the fig insect, which, having spent the winter in the slowly developing, winter caprifigs, emerges in the spring and crawls to the bases of the pistillate flowers to deposit its eggs. The pollen from the staminate flowers is thus carried across the pistillate flowers and the effect is soon evident in the swelling and ripening of the seed pods. See Cross-Fertilization.

The natives of India aided in the fertilizing of the figs by tying branches of the caprifig into the tops of the Smyrna trees during the time of their flowering. What we are accustomed to call the seed of the fig is really the fruit, a hardened pericarp surrounding the true seed.

With the introduction of the caprifigs and the fig insect into the United States the success of the fig industry was assured, since the climate and soil of many parts of this country are well adapted to its culture. Figs are raised in large quantities in the Gulf States and California. The latter state exports at least 10,000,000 lb. of the dry fruit annually, and the fresh fruit, though not adapted to transportation, is in demand in the neighborhood of the orchards.

Because of the fact that the blossoms of the fig are so hidden, it has become a localism in California that to "stay until the fig blossoms appear" means to remain indefinitely.

The wood of the fig tree was used by Egyptians in making mummy cases; it is spoken of in early sacred history, and in classic legend is said to have been invented by Bacchus, and was the tree in which rested the cradle of Romulus and Remus on the site of the future city of Rome.

Figaro. See Marriage of Figaro.

Fiji, *Fe' je,* **Islands,** a group of 200 islands lying in the South Pacific Ocean between 15° and 20° south latitudes, 177° east and 178° west longitude. Viti Levu and Vanua Levu are the largest of the islands and are of such size that they could comfortably provide for fully three times the population of the entire group. Only 80 of the islands are inhabited. The climate of the islands is uncomfortably warm, made especially so because of the dampness, and it is said that at Suva, the capital, a day without rain is unknown. The population of the islands is a curious mixture of whites, Samoans, Indians, Chinese and the Fijians themselves, a people conspicuous because of their tall straight build and their bushy hair always arranged in stiff pompadour fashion. They are generally cleanly in their habits and dress and are not at all the savages of earlier years. Controlled by the British Government, the Fiji Islander must work out his taxes with regularity, and upon occasion must serve in the army for a brief period. The chief food is the yam, but bananas, breadfruit, coconuts and other fruits abound. Sugar cane, cotton and tobacco are cultivated, and forests of valuable cabinet woods, as yet little known to European and American cabinetmakers, will some day prove a great source of revenue.

The Fiji Islands became British territory in 1874. The government is administered by a governor appointed by the Crown and assisted by executive and legislative councils. There are two public schools besides several mission schools. The prevailing form of religion is Methodist. The total area of the islands is 7435 sq. m., and the population, 139,600.

File, an instrument having cutting surfaces, or teeth, made chiefly by indenting steel bars, and used for abrading and smoothing surfaces. Files are made in various shapes and sizes and fineness of cut. The most common form used is the flat file, but they are also made square, triangular, round and half round, and generally tapering to the point. They are either single cut, having but one row of teeth, or double cut, having two sets of teeth crossing each other obliquely. The file is mentioned in history as early as 109 B. C. Formerly all files were made by hand and much skill was required not only in cutting them but also in tempering and hardening them, but they are made now almost exclusively by machinery. A rasp is a coarse file, used to abrade wood and also the hoofs of horses after the shoe is set.

Filipinos, *Fil"i pe' noze.* See PHILIPPINE ISLANDS, subhead *People.*

Fill'more, Millard (1800-1874), thirteenth president of the United States, born at Summerhill, N. Y. His parents were not able to give him more than a common school education, but he spent his spare moments in study, taught school for a time, and was assisted in his law studies by a lawyer who became interested in him. In 1823 he was admitted as an attorney to the Court of Common Pleas in Erie County, and in 1830 removed to Buffalo, where he established a successful practice. He was elected to the State Legislature in 1828 and served three terms, securing the passage of the law abolishing imprisonment for debt. He served in Congress from 1833 to 1835, and from 1837 to 1843. As chairman of the ways and means committee he was the author of the tariff law of 1842. He was regarded as one of the best debaters in the House.

Fillmore was elected vice-president of the United States on the Whig ticket with Taylor in 1848, and became president upon the death of the latter in 1850. The Compromise Bill of 1850 was the most important measure of his administration. In 1856 he made an extended visit to Europe. Fillmore was a man of decided views, but always open to conviction. While he did not enjoy the advantages of early education, he became a man of graceful and polished manners which were the expression of genuine refinement and dignity of character. See Study Guides.

Fil'ter, a contrivance designed to strain solid particles, particularly im-

purities, from water. A sheet of asbestos paper folded in the shape of a funnel generally forms a chemist's filter. Liquids strained through such filters are freed from all solid particles. Beds of sand and gravel in the earth act as filters for spring water. Rain water and water from lakes and rivers require filtering before using. Filters for domestic purposes are frequently made of two vessels, one within the other; the one through which the water is filtered is partially filled with alternate layers of powdered charcoal and sand, with a layer of fine gravel on top. Sometimes the inner vessel is made of a porous material, like unglazed earthenware, and the water seeps through, this being the principle of the Pasteur filter. Many water supply systems of cities include filters whose extent covers acres, and with bottoms lined with fine sand, gravel, etc., through which the water is filtered and made pure. See WATERWORKS.

Filters are used in the manufacture of sirups, vinegar, oils, wine, beer, fruit juices and many other substances. A filter composed of a number of metallic sieves, held together by rods and containing filtering materials, like charcoal, mineral wool, powdered glass, quartz, sand, etc., through which the liquid is pumped under heavy pressure, is known as a filter press.

Finch, the name given to certain seed-eating birds with heavy cone-shaped bills which vary in size and form, being light in such birds as the junco, very heavy in the grosbeak and cardinal, and the tips crossed in the crossbill. Many of the finches are beautiful in color as well as remarkable of song, as, for example, the goldfinch, canary, bullfinch, grosbeak, cardinal, etc. The Finch Family contains some 500 species, which are found in all parts of the world except the Australian region.

Finch, Francis Miles (1827-1907), an American jurist and poet, born in Ithaca, N. Y. He graduated at Yale, and, after studying law at Ithaca, began the practice of his profession, serving as associate justice of the New York Court of Appeals from 1880 to 1896. He assisted in the organization of Cornell University and became dean of the college of law in 1892. While at Yale he wrote a number of popular college songs, and his poem *The Blue and the Gray* has become a favorite.

Find'lay, Ohio, a city and county seat of Hancock Co., 43 m. s. of Toledo, on Blanchard's Fork of the Auglaize River and on the Lake Erie & Western, the Toledo & Ohio Central, the Cincinnati, Hamilton & Dayton and other railroads. It is situated in the natural-gas and oil fields of the state and is surrounded by a fertile agricultural region. Findlay is widely known on account of its wonderful yield of natural gas. There are extensive glass factories, oil refineries, bridge and engine works, machine and boiler shops, target works, potteries and manufactories of cartridges, brick, tile, furniture, brass goods, nails and wooden implements. In the vicinity are deposits of sand and gravel and beds of clay, lime and building stone. Findlay College, a coeducational institution, founded in 1882, is located here. There is also an orphans' home. Findlay was incorporated in 1837. Population in 1920, U. S. Census, 17,021.

Fine Arts. In the terms of the fine arts, which, in this article we will understand to mean architecture, sculpture and painting and their related arts, man writes his history so indelibly that all that has been committed to writing may be obliterated; earthquake, volcano, storm, flood may use their fullest power of destruction, yet will enough be left for a future age to reconstruct the life and history of the departed race. Naturally the race or individual reserves its highest and best to be expressed in the material that will last forever; therefore, we find that art has always been the mouthpiece of religion. When a race outlives its religion, its art becomes degenerate and naturalistic, and then resorts to copying the older arts or merely to making picture statements of nature as she appears to the eye.

Although primitive man uses pictures

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as a form of writing and as a means of recording important events, art, in its larger sense, cannot be said to begin until man has a desire to express beauty in things. As long as the shelter he builds for himself is constructed only with a view to keeping out the wind, rain, sun and his enemies, he is not creating architecture. Architecture in its strictest meaning is man's effort to build beautifully. It is called the "parent art" because when man begins to build permanent temples, shrines, houses, etc., he needs sculpture, painting and design to make his building more beautiful.

Architecture is always limited by the material that is at hand in any given locality. The simplest material to transport and the easiest to hoist into place is wood. The perishableness of wood is probably responsible for the loss to the world of much beautiful, historic buildings, amongst which may be numbered the wonderful Temple of King Solomon, of which nothing at present remains, except word pictures. The world, has, however, a marvelous example of the beauty that may be wrought into wooden structure in the architecture of China and Japan where the builders have used low timber buildings, because they better resist the shocks of earthquake with which both these countries must reckon.

Building with stone demands more skilled labor and much better facilities of transportation than a race has at its disposal until it has reached a high stage of development. Egypt, Greece and Rome have contributed to the world marvels of architecture, which, being wrought in stone, are still in good condition. These ancient buildings have always been the models, particularly in design, for succeeding styles, among which the most important are the Romanesque, Byzantine, Gothic, Renaissance, etc., each of which is treated in the article on architecture. Even in the architecture of our modern civilization when the methods of the old construction have become impracticable, we designate the building as Renaissance, Gothic, Byzantine, Romanesque or Greek, according to the type of applied decoration used.

Architecture of both stone and wood construction found sculpture to be the most logical form of decoration for both exterior and interior spaces. While Egyptians used all types of sculpture, such as the full round, relief and intaglio relief in its decoration, it remained for the Greeks to develop the most superb sculptural decoration the world has ever seen. The Greek temple was a shrine built to house the statue of some god or goddess, which statue was a superb work modeled in the full round. The cella walls, the metopes in the frieze, the pediment and the other parts of Greek buildings were made exquisite with relief decoration of gods, men and horses, all teeming with the spirit of life. The world has never ceased marveling at the art of the Parthenon frieze, the Victory of Samothrace, the Hermes of Praxiteles and many others.

All succeeding styles of architecture have had their characteristic sculpture. In China and Japan, where the most wonderful architectures of wood have developed, we find statues in the full round carved in wood and painted. Also in these countries we find the world's finest wood carving in relief, richly colored and gilded.

Painting has always been, from the early Egyptian times, an enticing means of decorating flat wall spaces, tiles, potteries and other small things, that demand design of two dimensions for flat or curved surfaces. We may also classify under the subject of paintings, the wonderful color decorations for floors and walls that the Byzantine and other builders have made in mosaics of stone and glass. While the Greeks did not use painting extensively as architectural decoration, their painted vases show us that they knew how to use the brush as well as the chisel.

The Italians at the time of their Renaissance attained a very high development in mural painting. The Romanesque architecture offered large expanses of wall space which the Church seized

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upon as a means of teaching the lessons of Christianity to a people, who before the invention of printing had no means of learning to read and write.

From Giotto to Raphael and Michaelangelo all the great painters gave their ability to the mural decorations of the churches. With the advent of Gothic architecture which replaced large wall spaces with enormous windows, stained glass took the place of Fresco and Tempora wall painting. The painter was thus driven, if he would preserve his art, to the small movable easel picture, which, having lost its function as a wall decoration, rapidly drifted into something independent of a place and rapidly developed into an imitative art of portraiture, landscape or illustration.

Closely related to painting is the wonderful color and design of the textile weaver whose product has always been an important accessory to architecture. In the tents of the nomadic tribes of Arabia and Asia Minor the wonderful product of the looms furnished both floor and wall covering. The loom and needle produced wonderful altar cloths, stoles, surplices and many other accessories of the Church ritual, as well as palace decoration, apparel of royalty and others.

The decoration of woven fabrics may all be divided into three classes: first, textiles such as rugs, carpets, brocaded silks and velvets and linens, in which the design is woven into the fabric; second, printed designs, such as are printed by rollers in machinery, wood-block and stencil printing being hand processes; and third, embroidery, which was originally a hand art but much of which is now done by machinery.

Under the subject of ceramics we may classify all products of the kiln which are useful, and sometimes necessary to the architect. In Chaldea, Assyria and Persia there was a poverty both of timber and stone, which necessitated the discovery of an artificial building material. Sun-dried and kiln-dried bricks were used in wall construction, and the walls were often covered with marvelously glazed and colored tiles. This probably led to the discovery of the wonderful ancient potteries which no modern country could possibly equal. Modern architecture of the steel-construction type is now finding the glazed tile a practical and beautiful covering for both exterior and interior use.

The whole subject of illustration and fine lettering is usually totally neglected in a history of the fine arts. During medieval times before the invention of printing, a very high order of art manifested itself in the hand lettering, illumining and binding of books. With the invention of the printing press and the invention and perfecting of means of reproducing pictures we still have an art belonging to the making of books. Never has there been a time in the history of printing when books have been so beautiful as they are today. American and European illustration began with wood engraving, which necessitated the cutting of the picture on a wooden block from which the print on paper was made. These blocks were perishable and only a limited number of prints could be made from each; consequently a means of making a more lasting plate had to be found, which resulted in the steel engraving and the copperplate. All of these processes demanded much hand work and hence were expensive.

Finally when photography had been perfected, chemistry discovered a way to eat out the parts of a picture that were not to be printed from a photograph on a zinc plate, and we had the process known as the zinc etching, by which means many illustrations are made. Later a means of reproduction, known as the half-tone process, was discovered, which reproduces all gradations of tone. Zinc etchings and half tones are usually in black and white only, color reproduction being a much more difficult process. The lithograph process engraves the picture on stone, to which color is applied and from which it is transferred to paper.

Now we have what are known as the three-color process and the four-color

process; in the former, the camera catches on one plate all the yellows, on another all the blues, and on a third all the reds; and in the four-color process is added a plate for all blacks. These are printed one above the other on the paper, a full-color reproduction resulting.

This reference work contains examples of zinc etchings, half tones and the four-color process. Only since the perfection of the methods of illustration, has it been possible to use books as a means of art as well as of literary expression. See ORIENTAL ART.

Fin'gal's Cave, a celebrated cave on the Island of Staffa off the western coast of Scotland. It is 227 ft. long, 60 ft. in height and from 22 to 40 ft. in width. Its chief feature is its lofty basalt columns, which are beautifully joined. See BASALT; GIANT'S CAUSEWAY.

Fin'land", a republic of Europe including in its territory a large part of Lapland, bounded on the n. by Norway, on the e. by the governments of Olonets and Archangel, on the s. by the Gulf of Finland and on the w. by the Gulf of Bothnia and Sweden. Its length from north to south is 700 m.; the maximum breadth is 400 m.; and the total area is 144,255 sq. m. The surface is a table-land, with an average height of from 400 to 600 ft., and containing Haldischok, a peak with an altitude of approximately 4100 ft. The main rivers are the Muonio, the Uleå and the Kemi. There are numerous lakes, and the country has become known as the "Land of the Thousand Lakes." The largest are Kalla, Enare, Torneå, Päyänne and Saima. Lake Ladoga touches the boundary on the southeast. The climate is rigorous and healthful, and the fertile soil produces an abundant forest growth, but the agricultural products are insufficient for home demand. Iron and copper are mined and large supplies of granite are quarried. The manufactures are gradually growing in importance, and the disadvantages of the geographical situation of the country are offset by the fact that the rivers furnish an abundant water supply. The principal manufactured products are wooden articles, iron products, textiles, lumber, leather and paper.

The Finns belong to the Finno-Ugrian race, ethnically closely related to the Esthonians and more distantly to the Magyars of Hungary. Helsingfors, the capital, is in the midst of a Swedish section. Fifteen centuries ago, the Finns occupied the northern half of Russia, they were gradually forced to the northwest by Slavic tribes from the south. In their lake dotted peninsula, the tribes retained their independence until the 12th century when they became a part of Sweden. Early in the 19th century, Finland was organized as a grand duchy of Russia and in the troublous days of the Russian Revolution regained their independence and organized a republican form of government. Population, 2,750,000.

Finland, Gulf of, an arm of the Baltic Sea, lying between Finland on the north and the Russian governments, Esthonia and St. Petersburg, on the south. It extends east and west over 250 m. and varies in width from 12 to over 80 m. The coast, bordered by small islands, is rugged, and navigation is hindered by sand banks and rocks, as well as by ice during the winter. Helsingfors, Viborg, Kronstadt and Reval are the principal ports.

Finley, John Huston (1863-), an American educator and editor, born at Grand Ridge, Ill., and educated at Knox College and at Johns Hopkins University. From 1889 to 1892 he was secretary of the New York State Charities Aid Association, and in 1892 became president of Knox College. In 1899 he accepted the editorship of *Harper's Weekly,* and, later in the year, that of *McClure's Magazine.* In 1900 he became professor of politics in Princeton University, and in 1903, president of the College of the City of New York. In 1913 Professor Finley succeeded Andrew S. Draper as commissioner of education for the State of New York. Besides contributing to reviews, he assisted in the preparation of *Taxa-*

tion in American States and Cities and *The American Executive and Executive Methods.*

Finns. See FINLAND.

Fin'sen, Niels Ryberg (1860-1904), a Danish scientist, discoverer of the method of curing various skin diseases with light rays. In 1893, three years following his graduation from Copenhagen University, he first announced his theory of the effect of light on the skin. Experimenting with artificial light rays, he invented an electric lamp which gave forth blue, violet and ultra-violet rays, by which he cured tuberculosis of the skin and cognate afflictions. The Danish Government recognized the value of his work, and aided him in establishing Finsen's Medical Light Institute in Copenhagen. In 1903 he was awarded the Nobel prize in medicine.

Fiord, *Fyord,* or **Fjord,** a long, narrow and irregularly-shaped inlet of the sea, indenting a mountainous coast. Fiords are bounded by steep walls of rock, which descend almost vertically to a considerable distance below the sea level. Their origin is probably due to glacial erosion, sinking of the coastal land and the transgression of the sea. The most notable fiords are on the coasts of Norway, the British Isles and New Zealand.

Fir, a handsome tree of the Pine Family, found in North America in the West from Alaska to Mexico and in the East from Labrador to North Carolina. It has a slender, straight trunk with horizontal, spreading branches. The bark, in young trees, is smooth, thin and resinous, generally pale in color; in older ones it is thicker and somewhat furrowed. The leaves, like those of all pines, are much reduced and may be recognized by a peculiar twist at the base which gives them a curved position on the stem. In different species these leaves are arranged differently on the twigs; in the older branches of the balsam fir they lie as smoothly on each side of the stem as though parted and brushed down; in others they entirely surround the stem in straight or curving spines. The flowers spring from the axils of these leaves and develop from buds which appeared the previous year. The fruit is a solid, resinous cone, cylindrical in form and slightly pointed.

The varieties common in the United States are the balsam fir, white fir, silver fir and red fir, or larch. Their wood is used for boxes and in the manufacture of pulp for paper making. The fir also grows abundantly in the Eastern Hemisphere, being common from the mountains of central Europe to eastern China and in the highlands of Africa. The wood of the fir was used for the ceiling of the Temple at Jerusalem, and the growing tree is the center of many Eastern legends. Many woodsmen have a superstitious fear of cutting it, and some consider it the true Christmas tree and inseparably connected with old St. Nicholas. Its leaves furnish the filling for fragrant and soothing balsam pillows. See DOUGLAS FIR.

Firdousi, *Fer doo' se,* or **Firdausi** (about 935-1020), the pen name of Abu'l Kasim Mansur, author of the epic poem, the *Shāh Nāmah,* or *Book of Kings.* The poem contains 60,000 verses and is a complete and valuable history of Persia. The writing of it was a task of 35 years. It is the oldest extant work in Persian literature and is distinguished by its dignified style, its patriotic appeal and the extraordinary knowledge of ancient history that it reveals.

Fire Alarm, a contrivance for announcing the outbreak of a fire. Fire alarms placed in large buildings are so constructed that a rise in temperature beyond the ordinary closes a circuit and rings a gong. The fire alarm used by the fire departments of cities consists of a central office containing the electric instruments, batteries, etc., which are connected by a network of wires to "call boxes" stationed in different districts of the city. These call boxes are made of cast iron, with two doors, the outer one of which is usually opened by a key exposing a handle or crank, which is pulled down or turned in order to send in an alarm. This action sets in motion

a wheel, which closes an electric current and rings the gong in the central office and generally in the engine houses of the district in which the alarm box is located. The engine-house gong gives automatically the number of strokes indicating the number of the district in which the fire is located. The recording apparatus in the central office also gives this information to the chief and his assistants.

Fire'bird". See ORIOLE, subhead *Baltimore Oriole.*

Firecrackers, bombs made of paper cylinders enclosing explosive materials, which are ignited by projecting fuses. They are made principally in China and by hand. The fuses of 64 firecrackers are braided together, forming a pack, which is wrapped in paper with gilt letters on red labels. Firecrackers were invented by the Chinese, and have been used by them for centuries in celebrating anniversaries of historical events and festivals. In the United States they form a large part of the fireworks consumed each year on the Fourth of July. Giant firecrackers are made as large as three inches in diameter and 12 inches long, and like all others, should be handled with the greatest care and never be touched after they are lighted. Lockjaw and blood poisoning frequently result from wounds made by firecrackers. See FIREWORKS.

Fire Damp, a name given by miners to explosive mixtures of gases found principally in coal mines. They usually consist of carbureted hydrogen, which with air ignites and explodes. This gas is also called methane, or marsh gas. It is formed by the decomposition of coal, and is frequently productive of destructive results in mines when exposed to a flame. Miners secure protection from this danger by using a safety lamp instead of a candle. See SAFETY LAMP.

Fire Department, an organization maintained in cities and towns for the purpose of extinguishing fires. It is usually a department of the municipal government and supported by taxation. A paid fire department is one in which the members devote all their time and are employed on a salary. A volunteer fire department is composed of members who serve only when called upon. The organization and the character of apparatus used depend largely upon the height and type of the buildings to be protected, also upon the nature of the available water supply. The apparatus usually consists of steam fire engines; fire hose, carried on carts in a reel or laid in folds in a wagon; ladders of various kinds, including extension ladders; chemical engines; hand chemical fire extinguishers; water towers for projecting hose streams from points opposite upper-story windows; and many minor devices for climbing tall buildings and tearing them down, when necessary to confine the area of a fire.

In planning and constructing a fire station, the greatest effort is made to bring everything into immediate action and to enable the company to reach the scene of the fire at the earliest possible moment. To assist in this, electric fire-alarm systems are employed (See FIRE ALARM). The members and horses of each station are thoroughly drilled in quick and concerted action, so that in less than a minute after the alarm is sounded the company and apparatus are on the way to the fire. Hitching devices for the almost instantaneous adjusting of harness to horses drawing the apparatus are used, and the horses are trained to take their places on the alarm of fire, when an electric device unfastens their stall chains and a release mechanism opens the main doors of the fire station. Firemen sleeping on the floor above the apparatus have their clothes so designed and arranged that in the event of a fire at night they can almost instantly clothe themselves and slide down poles to their positions on the apparatus, ready to leave the house in a few seconds.

The fire department in all large cities is a highly organized body under a chief and several assistants, and is usually divided into companies, each under command of a captain. One or more of

these companies occupy the fire station where the fire apparatus and horses are kept. See FIRE ENGINE; FIRE ESCAPE; FIRE EXTINGUISHER.

Fire Engine, an apparatus consisting chiefly of force pumps for throwing water to extinguish fires (See PUMP). Formerly these pumps were worked by hand, but now nearly all of them are operated by steam. A steam fire engine consists of two pumps mounted on a frame and driven direct from a steam engine, the whole, together with a suitable boiler and fittings, being carried on a strong wagon. Two or more lengths of suction hose and the engineer are carried on this wagon, while several hundred feet of hose are carried on a hose reel or on a separate wagon. Fire engines were formerly pulled by two strong horses, but now, in the larger cities especially, motor trucks are usually used for this purpose. A chemical fire engine is one in which chemicals generate carbonic acid gas (See FIRE EXTINGUISHER), and this with water is used successfully to extinguish fires. The whole apparatus is mounted on a small fast automobile which is provided with a hose reel.

The chemical fire engine uses only a small quantity of water, and will extinguish a small fire with less damage than the ordinary engine, but it is practically useless in a large fire.

Fire Escape, a device for enabling people to escape from a burning building. The most common forms are iron ladders attached to the wall of the building or iron stairways similarly attached, located so that they can be reached from a window in each story of the building. An improved plan encloses the stairway with fireproof walls, so that the inmates can make their escape with entire safety. A device resembling a standpipe and having a spiral canvas slide within is sometimes used for school buildings. Small hotels often have ropes in sleeping rooms. One end of the rope is secured to the wall, and a sliding device, which allows the inmate to descend slowly to the ground, is fixed to the rope. All states have stringent laws requiring fire escapes to be placed on all public buildings, and in large cities, on all private buildings containing a large number of people, such as office buildings.

Fire Extinguisher, a contrivance for extinguishing fires. A hand fire extinguisher usually consists of a metal cylinder holding about five gallons of water; into this water is put common baking soda, forming a solution. In the top of a cylinder and held by a clamp is a small glass bottle containing sulphuric acid. A hand wheel, or lever, is on the outside of the cylinder and so arranged that when it is desired to use the extinguisher it is screwed down upon the glass bottle, which it crushes. This allows the acid to mix with the solution and generate carbonic acid gas. The gas creates a great pressure, thus forcing out the water with it through the hose on the fire. These extinguishers are generally carried and operated on one's back and are very efficient in putting out small fires. Two of these extinguishers, holding about 40 gallons each and mounted on a special wagon, form what is known as a chemical fire engine, and is used by fire departments of cities. Glass bottles, filled with various chemical solutions to be thrown on fires, are known as fire grenades.

Fire'fly", a member of the Lampyrid Family of beetles. These insects are called flies because they are inconspicuous except when on the wing. Rising from the damp grasses of marsh and meadow during the summer twilight, many of these little creatures may be marked in flight because of the luminous spot which is exhibited as the wings are spread. During the day, if the locality is searched, little soft-bodied, leathery-winged beetles may be found, generally waiting, nearly motionless, the approach of dusk. They have long, straight bodies, legs that have a backward direction, as do also the long antennæ, and rounding heads. The luminous patches are generally situated upon the last segment of the abdomen and are groups

of cellular tissue capable of uniting with the oxygen, sent from the trachea, in such a manner that a slow combustion takes place. The glowworm is the wingless female of the firefly and is also capable of emitting light. In some species the eggs and larvæ, which may be found early in summer just below the surface of the ground, are also luminous; but while in the larval and adult stages the ability is under nerve control, in the egg it is, of course, involuntary. Fireflies are among the insects helpful to man, for they destroy harmful insects and aid in keeping down noxious weeds.

Fireworks, preparations of combustible substances and explosives for the purpose of producing an attractive display when ignited. The origin of fireworks is unknown, but they have been in use in the East since the beginning of history, and their manufacture in China and Japan was long since brought to the highest degree of perfection. The materials used in the manufacture of fireworks are gunpowder, charcoal, sulphur, saltpeter, chlorate of potash and other compounds containing a large proportion of oxygen and salts of metals, which, when burned, add brilliant and peculiar coloring to the flame. The fireworks in most common use are Roman candles, rockets, pin wheels, revolving triangles and colored lights. Roman candles consist of a paper tube containing a number of balls of combustible material and separated by layers of gunpowder. As each successive layer of gunpowder is ignited, it throws out the ball above it, at the same time igniting the ball, which explodes in the air and produces a colored light. Each ball usually produces a different color from the one preceding it. Pin wheels and other revolving pieces produce beautiful whirling effects. Set pieces of great beauty and elaborate designs are made for the celebration of special occasions. In the United States fireworks are used more generally on the Fourth of July than at any other time.

Fish, one of the large divisions of vertebrate animals, characterized by their aquatic habits, which necessitate their breathing by means of gills rather than lungs. In zoological classification the Fishes, or Pisces, are ranked as the lowest of the group which also contains Batrachians, Reptiles, Birds and Mammals. Fishes show in their general form a special adaptation to their mode of life, for their bodies present a comparatively small surface to the resistance of the water, and their scales, which overlap like the shingles of a roof, are fitted to shed it.

The head of a fish is generally pointed and compressed laterally, as is also its body, and there is no perceptible neck; past the middle, the body slopes toward the tail, which is its organ of motion, its rudder and sometimes its means of defense. In place of limbs, which are not at all represented in the skeleton, the fish has two sets of paired fins to act as balancers and to aid in motion. Those which correspond to the forelimbs are called the pectoral fins and are located upon each side of the body; the pelvic, or ventral, correspond to the hind limbs but are variously placed. The median fins are rarely paired and are located on the upper and lower parts of the body; the dorsal fin upon the back, the caudal, at the tail, and the anal, below the abdomen. The fins are made up of more or less flexible rods, connected and supported by a stout membrane.

The gills are located at the back of the mouth and consist of a number of arches upon each of which are two rows of red fringes, in which the blood comes very near to the surface. Water is taken in through the mouth, passed through the bronchial clefts and out at the gill openings upon each side of the head. As it passes the gill arches the blood takes up the oxygen dissolved in the water and gives off the impurities, acting in much the same way as in the lungs of higher Vertebrates. The bone-supported coverings of the gill openings are called the operculums.

The special senses of a fish are not ordinarily very highly developed; the

tongue is flat and gristly and generally not free in movement; it is neither an organ of speech nor of taste; the eye has an almost globular lens, which renders it able to see clearly in the denser medium of the water, but nearsighted in the air. The nostrils are located high in the forehead and are not used for breathing, but are for the detection of food in the water. There are no external ears.

The scales differ greatly in different species and their form is often a means of identification of different groups. They are composed of a bony skin tissue and generally lie in rows; not all fishes, however, have scales. The coloring matter lies chiefly in a thin, epidermal tissue covering the scales; the colors vary greatly and are apt to fade readily. High-swimming fish are generally dark-colored above and light below; those which swim low are apt to be light above.

A little above the middle upon each side of the body lies a row of specialized scales which are supposed to have some connection with the nervous system. The line which they form is called the lateral line.

In internal anatomy fishes have the same general structure as other Vertebrates. One particularly differing feature is the presence of a gas-filled air bladder which assists the fish in rising readily to the surface. Many fishes are provided with horns, sharpened fins, swordlike bills or other means of defense, but they rarely use these unless attacked. Reproduction is generally by means of eggs.

The fish constitute one of the largest important classes of Vertebrates, comprising about 12,000 species included in 200 families. As a food they are highly prized. The coast and lake fisheries form a great industry, and the salting, preserving, drying and shipping of the catch form other important occupations. For further discussion see articles upon particular species; also FISH COMMISSION, UNITED STATES; FISHERIES; FISH HATCHERY; SPAWN.

Fish, Hamilton (1808-1893), an American statesman, born in New York City. He graduated from Columbia in 1827, studied law and was admitted to the bar in 1830. In 1842 he was elected to Congress as a Whig, serving one term. He became lieutenant-governor of New York in 1847, was governor in 1849-51, and in the latter year was elected to the United States Senate. In 1857 he went to Europe with his family for several years of travel. General Grant appointed him secretary of state in 1869 and he served in that capacity for eight years. He was influential in negotiating the Treaty of Washington and in settling the Alabama Claims and the northwest boundary controversy. See ALABAMA CLAIMS; WASHINGTON, TREATY OF.

Fish Commission, United States, a bureau established by Congress in 1871 and in 1893 made a part of the United States Department of Commerce and Labor. It is headed by a commissioner, appointed by the president, whose specific title is commissioner of fish and fisheries; he is aided in his duties by an assistant commissioner. The duties of this commission as stated by the act which established it, are three: the propagation of useful food fish, the term *fish* being used to include such aquatic animals as lobsters, seals, whales, oysters and other shellfish; the investigation of causes which have led to the decrease of food fish in waters of the United States, and inquiry into the resources for the development of commercial fisheries; and the collection and compilation of statistics in regard to domestic and foreign fisheries. The first fish commissioner was Spencer F. Baird. See FISHERIES; FISH HATCHERY.

Fish'er, Sydney Arthur (1850-), a Canadian statesman, born in Montreal and educated at McGill University and at Trinity College, Cambridge. Having devoted himself to farming, he has identified himself with various fruit, stock, dairy, forestry and agricultural associations, was one of the founders of the Provincial Fruit Growers' Association, and in 1909 at Washington, D. C., attended the conference which met to con-

sider conserving the natural resources of the American continent (See CONSERVATION). As a Liberal he sat for Brome, in the House of Commons, from 1882 to 1891 and from 1896 to 1911, in July, 1896, becoming minister of agriculture in the Laurier administration. From this position he retired in October, 1911. An excellent debater and a keen politician, Mr. Fisher was the cause of much beneficial legislation. He believed that "all natural resources should be available by the whole people and should not be controlled by or given away to private corporations." At Ottawa he founded the National Art Gallery and the Archives Bureau.

Fisher, Walter Lowrie (1862-), an American lawyer and publicist, born in Wheeling, Va. (now W. Va.), and educated at Marietta College, Ohio, and Hanover College, Ind. In 1888 he was admitted to the bar, and he soon rose to professional eminence in Chicago. In 1901 he became secretary and in 1906, president of the Municipal Voters' League of Chicago. Three years later, with Gifford Pinchot, he drew up the declaration of principles on the formation of the National Conservation Association, of which he was vice-president. In March, 1911, President Taft appointed him secretary of the interior.

Fisheries, the taking of any aquatic animals and preparing them for the market. Thus under the control of the Bureau of Fisheries of the United States are included the taking of whales, lobsters, shrimps and shellfish, as the oysters, clams, etc., and even the securing of pearls and sponges, as well as the taking of fish.

The United States is the leading country in the value of its fisheries and in the amount of capital invested therein. Japan ranks second and England, including Wales, is third. Of the United States fisheries the oyster fisheries are at present the most valuable and have shown the greatest increase in recent years. This is due, no doubt, to the improved methods of treating the beds and caring for the young oysters (See OYSTER). Second in importance in the United States are the salmon fisheries, which are the most valuable upon the Pacific coast (See SALMON). Next in order of value are the catches of cod, sea herring, shad, lobsters and clams. The fisheries of the Great Lakes, where 100,000,000 lb. of fish are taken annually, are highly important. Whitefish, lake herring, lake trout and perch are taken in great numbers, and fishing, with its allied industries, forms one of the important occupations of those states bordering upon the lakes. Lake Erie has the greatest yield of fish and Lake Michigan is second. The New England fleet of fishing boats is the best equipped, doubtless because the industry is oldest in the East. The cod, herring and lobster fisheries are there best developed.

To John Adams, the United States is vastly indebted for the preserving of her fishing rights. In 1783 he stood out, even against the persuasion of his colleagues, and refused to sign the Treaty of Paris until the fishermen of the United States were allowed to fish in Canadian waters. Trouble between Canada and the United States continued, however, until 1818, when a joint commission from the two countries revised the terms of agreement in regard to fishing rights. Points of dispute have since then continually arisen, and in 1910 the matter was referred to The Hague Tribunal for settlement (See FISHERIES QUESTION). The main point of disagreement has been as to whether the three-mile limit for government control of waterways is to follow the coast line or to be measured from headland to headland.

Fish are prepared for the market by smoking, drying, freezing, salting or canning. These preparations are carried on, in many cases, upon the boats, but most frequently at the port where the cargo is landed. The following fish are commonly found in the market:

Sturgeon: fisheries of less importance than formerly. Used in the production of isinglass, caviar and fertilizer; also put upon the market smoked.

Herring: members of this family the

most important in the world as a food fish, though not so highly prized in the United States. Sold smoked and pickled, or fresh as bait for cod.

Shad: sold fresh, salted or smoked.

Alewife: less valuable than formerly. Sold smoked or salted.

Menhaden: valued as a fertilizer and for its oil. Sold salted or fresh.

Salmon: most important North American fish. Sold canned, smoked or fresh.

Whitefish: shipped frozen, salted and smoked.

Mackerel: one of the valuable food fish. Generally salted or dried.

Smelt: offered upon the market canned or fresh.

Cod: the best-known dried or salted fish.

Halibut: sold fresh, salted or smoked.

Other fish, as pickerel, catfish, sea bass, mullet, sunfish, etc., are sold fresh or occasionally in other forms, but not in sufficient quantities to allow them to be considered as special industries. See FISH COMMISSION, UNITED STATES; FISH HATCHERY; NET; and articles on the various fish mentioned in this article.

Fisheries Question. Before the Revolutionary War the fishermen of the American colonies had free access to the fishing grounds of Newfoundland, Labrador and the Gulf of St. Lawrence, but after the war the inhabitants of Canada protested against the continuance of this privilege. After a long debate a compromise was effected in the Treaty of Paris, Sept. 3, 1783. The War of 1812, however, did away with this treaty, the fishing right was denied the United States, and Canadian governors were instructed to exclude United States fishermen. In 1818 a joint convention of the two countries decided that the United States renounce for American fishermen the liberty of fishing, with certain exceptions, within three miles of any of the coasts of the British dominions in America. By the Treaty of 1854, reciprocal trade being established between Canada and the United States, fishing was allowed the latter on the shores of all British colonies except Newfoundland. This treaty, however, terminated in 1866 at the instance of the United States, and the conditions of 1818 were revived. In 1871, by the Treaty of Washington, the United States fishermen were allowed to take fish of any description, except shellfish, in Canadian waters, the British fishermen to have the same privilege in American waters north of latitude 39° north. This treaty was terminated in 1885 by the United States Government, and the dispute dragged on without definite settlement until 1910, when the difficult problem was solved by a decision handed down by The Hague Tribunal.

THE FISHERIES AWARD. The decision, which was promptly accepted and which gave general satisfaction, upheld two points maintained by Great Britain and five of those claimed by the United States. The first question, decided in favor of Great Britain, which involved a seeming cession of sovereignty, was generally considered the most important. On the other hand, the British cannot make American fishermen report to customs houses; they cannot impose on these fishermen light, harbor or other dues; the United States fishermen may employ Newfoundlanders on fishing vessels and these vessels have the right to purchase supplies as well as to enjoy other commercial privileges. The award also provides that disputed fishing regulations shall be submitted to an impartial commission, composed of one expert from each country and the fisheries adviser to the Dutch Government, and recommends that a similar commission be made permanent.

Fish Hatchery, a place where the artificial propagation of fish is carried on. It is generally a building or group of buildings supplied with constantly running water and fitted with tanks or cans for the eggs, and long troughs for the reception of the young fish. It must also be so arranged that the temperature may be easily regulated. Fish hatcheries have been established for the purpose of studying more closely the habits of food fishes, preventing the extermination of the popular species which were in danger

of annihilation, and of introducing species into waters fitted for their growth and increase. In China and European countries, where artificial propagation has long been practiced, the hatcheries are mainly private and answer the same purpose as the similarly managed game preserves; in the United States they are almost entirely owned and controlled by the National Government, although there are a few private hatcheries and some under state control.

Fish may be easily propagated in hatcheries because of their method of reproduction, and there they are kept from danger of their chief enemies, the other fish which would destroy the eggs. For the United States hatcheries, the fish are collected by government employees, who are sent to certain localities to procure the special species desired; the marine fish are collected by means of boats particularly fitted for the purpose. The fish secured are sent to the hatchery, where they are stripped of their eggs, or spawn; the eggs are then mixed with the fertilizing milt in vats or cans, where they can be stirred gently for a short time. The fertilized eggs separate from the egg mass and are then removed to other repositories where their treatment varies according to the species. The eggs of the fresh-water fish are generally placed in McDonald jars, which are large glass bottles having round bottoms and tubes that allow a constant flow of water. The time of hatching depends upon the species of fish and may be from a few days to three weeks from the time of fertilization. The fry, as the young fish are called, are then transferred to the long rearing troughs, where for four or five weeks they feed upon the yolk sacs yet attached to their bodies. At this time in particular they need plenty of clear water at not too high a temperature, and they must be watched carefully for the presence of parasites, which are extremely destructive and easily spread. When feeding is begun it must be done frequently and with care that the fry are neither over- nor under-fed.

The fish are generally planted, that is, placed in the waters to be supplied, during their first season, when they are about three or four inches long; they are then spoken of as fingerlings. Sometimes, however, they are kept at the hatchery, either in the tanks or in outdoor ponds, until the second summer and then sent out as yearlings. Occasionally the fry, as well as the eggs, are brought to the hatchery, but this is not commonly practiced since they are more apt to suffer from the change of surroundings.

The first government hatchery ever established was that of Alsace in Germany in 1850. In the United States a private hatchery was started in 1865 by a New Hampshire doctor who brought salmon eggs from Canadian waters and successfully propagated the salmon. At present the United States Government operates 55 stations in 29 states and territories, and has in constant service the steamer *Fishhawk,* which is really a great floating hatchery. The fish to which the greatest attention has been given are the cod, halibut, salmon, trout, herring and catfish. See FISHERIES; FISH COMMISSION, UNITED STATES; FISH.

Fish Hawk. See OSPREY.

Fishkill-on-Hudson, or **Fishkill Landing, N. Y.,** a city of Dutchess Co., 59 m. n. of New York City, on the east bank of the Hudson River and on the New York Central and the New York, New Haven & Hartford railroads. It is one of the oldest towns in the state and has considerable historical interest. In 1776 the Provincial Convention of New York met here, and from 1776 to the close of the Revolutionary War it was one of the principal military depots of the Northern army. Fishkill has steam ferry connection with Newburgh across Newburgh Bay on the west side of the Hudson. The DeGarmo Institute is located here. Its manufactures include Corliss engines and boilers, hats, rubber goods, tools, brick, etc. Fishkill Landing and Matteawan Villages have consolidated and incorporated as Beacon City. Population, 1920, 10,996.

Fiske, *Fisk,* **John** (1842-1901), an American historian, lecturer and philosopher, born in Hartford, Conn. Precocious as a boy, Fiske was able to read and enjoy the best English authors at the age of eight, and by the time he was 13 he was acquainted with the Latin classics. He graduated from Harvard in 1863 and from Harvard Law School in 1865, but never practiced. From 1869 to 1879 he was identified with Harvard University as lecturer on philosophy, instructor of history and assistant librarian. Five years later he became professor of American history in Washington University, St. Louis. Early influenced by Darwin and Herbert Spencer, Fiske upheld the doctrine of evolution, and his *Outlines of Cosmic Philosophy* exemplified this. It is probable that he, more than any other American writer, is responsible for the clearness with which these philosophies are commonly understood. He also wrote *Origin of Evil.*

Fiske was one of the most eminent historians of his time. His works show a broad knowledge of the subject, are sympathetic in treatment and clear and pleasing in style. However, his views are not always impartial. His historical works include *The War for Independence, The American Revolution, A Critical Period of American History, The Beginnings of New England, The Discovery of America, A United States History for Schools* and, besides *Old Virginia and Her Neighbors,* further include *Dutch and Quaker Colonies in America* and *Civil Government of the United States, New France and New England.* His three essays, *The Federal Union, The Town-Meeting* and *Manifest Destiny,* appeared as one volume under the title *American Political Ideas Viewed from the Standpoint of Universal History.* Besides being the author of various other essays, including *Myths and Myth Makers,* he coedited, with James Grant Wilson, *Appleton's Cyclopædia of American Biography.*

John Fiske was the son of Edmund Brewster Green. In 1852 his father died, and three years later, upon his mother's second marriage, the boy dropped his real name of Edmund Fiske Green and assumed that of John Fiske, which was the name of his maternal grandfather.

Fiske, Minnie Maddern (1865-), an American actress, born in New Orleans, La. As a child she played under her mother's family name of Maddern, appearing first on the stage at the age of three. She was brought out as a "star" in 1882 in *Fogg's Ferry.* In 1890 she married Harrison Grey Fiske, and for three years retired to a life of quiet and study. She played in *Hester Crewe,* a play written by her husband, in 1893, and this was followed by repeated successes in other dramas. Among her triumphant rôles are Becky Sharp and Tess of the D'Urbervilles. She also appeared in *A Bit of Old Chelsea, A Doll's House, Frou Frou, Magda, Little Italy* and *Salvation Nell.* In 1901 she opened the Manhattan Theater, an independent playhouse, in opposition to the American theatrical trust. Her acting is characterized by dramatic realism, intelligence and sustained emotional appeal.

Fitch'burg", Mass., a city and one of the county seats of Worcester Co., 45 m. n.w. of Boston and 42 m. n. of Worcester, on the Nashua River and on the New York, New Haven & Hartford and the Boston & Maine railroads. The villages of Rockville, Traskville, South and West Fitchburg and Fitchburg Center are included within the corporate limits of the town. The city has an area of over 28 sq. m. and is surrounded by picturesque scenery. Fitchburg is the second city in Massachusetts for the production of paper. There are granite quarries in the vicinity, and the manufactures include textiles, fire arms, engines, electrical appliances, machinery, and tools. Over 9,000 people find employment in the factories. The city is noted as having established the first cooperative industrial course in connection with a public school in America. Among the educational institutions are a state normal school, with model and training schools. There is also a state armory, a

Federal building, a courthouse, a library, and two hospitals, and many fine churches.

The suburbs include Whalom Park, one of the natural beauty spots of the state, and Wachusetts Mountain a state reservation.

The city has quite a large French population and the largest Finnish population of any city in the United States. Population in 1920, 41,029.

FitzGerald, *Fits Jer' ald,* Edward (1809-1883), an English poet, born in Suffolk. He adopted no profession, but lived in retirement, devoted to his books and his garden. In addition to his admirable English version of the *Rubáiyát* of Omar Khayyám, he also translated dramas of Æschylus, Sophocles and Calderon. His letters reveal a man of marked individuality, sympathy and wit.

Fiume, *Fyoo' me,* a seaport at the head of the Gulf of Quarnero on the east Adriatic shore. The peninsula of Istra separates it from the Adriatic proper. Before the World War, it was, politically, a part of Hungary and a railroad connects it with Budapest. It was to Hungary what Trieste was to Austria, their window on the sea; and next to Trieste it was the most important seaport on the Adriatic. It was also the natural seaport for Croatia and Bosnia. At the conclusion of the World War, the possession of Fiume was earnestly desired by Jugo-Slavia, by reason of its importance strategically and economically to the new republic. Italy desired it by reason of its strategical importance being one of the keys to the north Adriatic shore. (See DALMATIA.) Its possession greatly strengthens Italy's position as mistress of the Adriatic. The Allied Council in Paris gave Italy possession of Fiume in December, 1919. (See ANNUNZIO, GABRIELE D'.)

Five Civilized Tribes, the name given by the government to the five tribes of Indians living in what was formerly Indian Territory. Here they formed for some time five almost independent republics under the protection of the United States Government. In 1898 a commission was appointed to divide the lands of the reservations among individual Indians. In 1906, when the work of the commission was completed, the Indians of the Five Tribes became citizens of the United States. See CHEROKEE; CHICKASAW; CHOCTAW; CREEK INDIANS; SEMINOLE.

Five Forks, Battle of, a battle of the Civil War, fought Apr. 1, 1865, a few miles from Petersburg, Va., between 25,000 Federals under General Sheridan, and a slightly smaller Confederate force under General Pickett. It was Grant's object to prevent Lee's escape southward, and he had therefore sent Sheridan to take the Confederate rear at Five Forks. The strong force which the Union troops there encountered was reinforced by Pickett with 7000 men, and Sheridan was pressed back till relieved by Warren. The following day, Apr. 1, a desperate battle took place, in which the Confederates were defeated with a loss of about 5000 men to the Federals' 1000.

Five Nations, the union of five Indian tribes living in the Valley of the St. Lawrence and in New York and Pennsylvania. It originally included the Cayugas, Hurons, Mohawks, Oneidas, Onondagas and Senecas; later the Tuscaroras were added and the confederacy was sometimes known as the Six Nations. The league was said to have been founded by Hiawatha, and its bonds still exist among the survivors of the tribes.

Flag, a piece of thin cloth, usually attached at one end to a standard and used as the emblem of a nation, state or other organization or for signaling. Aside from its color, the flag may bear some device, as the cross of St. George in the original British flag. In the army the flag represents the regiment, each regiment having its particular flag or colors which are used in connection with the national flag. In the navy, flags are the distinguishing emblems of the different nations. Flags are also used in signaling (See SIGNALING).

The most important use of the flag is as a national emblem. As such it becomes the representative of its gov-

ernment, and any insult to the flag is considered an insult to the nation it represents. In addition to its national standard, each nation has a number of flags, each representing some particular thing, as the Royal Standard of Great Britain, the President's Standard in the United States and the rank of the commanding officer on a ship in the navy. In the United States navy the admiral's flag is a broad blue pennant, with four stars in the center; the rear-admiral's senior in rank is a similar pennant with two stars, one above the other; the rear-admiral's second in rank is a broad red pennant with two stars one above the other. Pennants are long, narrow flags, usually coming to a point. The United States navy pennant has white stars in a blue field, and the revenue pennant has vertical white and red stripes and blue stars on a white field. The revenue flag has vertical stripes and a union of the eagle and shield surrounded by a circle of blue stars in a white field. The yacht ensign has a blue union with a circle of white stars surrounding an anchor which is also white. The lighthouse service is distinguished by a triangular flag having a red border surrounding a white field, in which there is a lighthouse in blue. The president's flag is a blue flag with the eagle and shield in gold in the center; that of the secretary of war is red, with a white star in each corner and the eagle and shield in the center; and that of the secretary of the navy is blue, with a white star in each corner and a white anchor in the center.

Jacks are national flags used for signaling and other purposes. Other flags also have national import. A red flag displayed by a vessel denotes that it has powder or other explosives on board; a yellow flag denotes quarantine; and a white flag in war indicates a desire for the cessation of hostilities while a parley takes place. A flag reversed, that is, in case of the American flag, with the union below, indicates distress. A flag at half-mast, that is, raised only half the height of the standard, indicates mourning for some national official. When a flag is struck or hauled down in war, it indicates surrender. A white flag raised over a fort or on the mast of a ship is also the signal of surrender. See FLAG, UNITED STATES.

Flageolet, *Flaj" o let',* a small wind instrument consisting of a wooden tube having six or more holes and fitted with a mouthpiece. When played it is held in a vertical position. The flageolet has a shrill tone and has not been used in orchestra since the time of Mozart. Its range is slightly over two octaves.

Flag of Truce, a white flag displayed for the purpose of securing a cessation of hostilities for parley. This white flag has come to be recognized by all civilized nations and by some uncivilized tribes as a sacred thing whose bearer is to be spared. To be sure of this immunity, however, the flag must not be carried forward during an engagement, nor when the bearer is warned not to approach. It must be sent by the senior officer present, and can be received only by the will of the senior officer on the other side. The same rules apply in the main in naval warfare.

Flag, United States. The United States flag in its present form is the outgrowth of various attempts to design a national banner. Naturally the early colonists used the flag of the Mother Country, which was the red ensign adopted in 1707 and used until 1801. This was a red flag with a union consisting of the cross of St. George in red, and the cross of St. Andrews in white on a blue field. But the New England Colonies early adopted a banner of their own, in which the cross of St. George in red in a white field with a pine tree or a globe in the upper left-hand corner of the canton replaced the union in the national ensign. This flag was carried by the colonial troops in the Battle of Bunker Hill. With the beginning of the war for independence, many banners were designed, but none had any national significance. Chief among these were the pine tree flag of Massachusetts, a white flag with a pine tree in the center, and under it the motto "An Appeal to

Heaven;" the snake flag of the *Pennsylvania Gazette,* a white flag in the center of which was a snake cut into nine sections, the head representing the New England Colonies, and each of the other sections one of the other colonies; the rattlesnake flag, a yellow flag with a coiled rattlesnake in the center and underneath the motto "Don't Tread on Me;" and Colonel Moultrie's flag, a blue flag with a crescent in the upper left-hand corner and the word "Liberty" extending through the middle of the field.

ORIGINAL STARS AND STRIPES. The first flag adopted as the national ensign of the colonies in 1776 was designed by a committee consisting of Benjamin Franklin, Mr. Lynch and Mr. Harrison, all members of the Continental Congress. It consisted of thirteen stripes, alternating red and white, and the union of the royal ensign of 1707. The stripes represented the thirteen colonies and the union indicated that they still belonged to Great Britain. With the passage of the Declaration of Independence, the union with Great Britain was dissolved, and on June 14, 1777, Congress resolved "that the flag of the thirteen United States be thirteen stripes, alternate red and white, and that the union be thirteen stars, white in a blue field, representing a new constellation."

THE PRESENT FLAG. With the admission of Vermont and Kentucky, the number of stripes and the number of stars were increased to fifteen, and this was the authorized flag until 1818, when the number of stripes was reduced to thirteen, and the plan of adding a star to the union on the admission of each new state was adopted. The star is officially added on the Fourth of July following the admission of the state. The national banner now consists of thirteen stripes and forty-eight stars.

It was the flag of fifteen stripes that waved over Ft. McHenry when that fort was attacked by the British in the War of 1812, and it was this flag that inspired Francis Scott Key to write *The Star Spangled Banner.* Joseph R. Drake's poem on the flag is widely known.

When Freedom from her mountain height
  Unfurled her standard to the air,
She tore the azure robe of night,
  And set the stars of glory there.
She mingled with its gorgeous dyes
The milky baldric of the skies,
And striped its pure celestial white
With streakings of the morning light;
Then, from his mansion in the sun,
She called her eagle bearer down,
And gave into his mighty hand
The symbol of her chosen land.

* * * * * * *

Flag of the free heart's hope and home!
  By angel hands to valor given,
Thy stars have lit the welkin dome,
  And all thy hues were born in heaven.
Forever float that standard sheet!
  Where breathes the foe but falls before us,
With Freedom's soil beneath our feet,
  And Freedom's banner streaming o'er us?

Flame, gas made luminous by heat. Under ordinary conditions it is produced by the chemical union of the gaseous material with the oxygen of the air. The amount of light and heat evolved by a flame varies according to the substance of which it is composed; hydrogen burns with a pale blue flame, calcium with an intense white flame and carbon compounds with a yellower flame. The flame of an ordinary candle consists of three parts: the inner cone, 1, is a dark portion of gas which does not burn because the oxygen has no access to it; surrounding that is a layer of partly burned gas, 2, in which are numerous carbon particles that are highly heated; the outer cone, 3, is the region of perfect combustion in which all of the carbon is being converted into carbon dioxide; 4 is the unburned wick. A flame of illuminating gas shows the same structure.

CANDLE FLAME

Gas which burns with little luminosity may be made more luminous by the addition of carbonaceous gases. Such gas is said to be "enriched." The flame of the gas stove is made less luminous but hotter by adding air to the gas. This principle is also made use of in the Bunsen burner, which

increases or decreases the amount of heat and light by the change in the air supply.

Flamin'go, a family of birds related to the ducks. The legs and neck are very long and the bill is peculiarly bent downward and provided with toothlike projections. From this characteristic the order receives its Greek name, which signifies toothed-tongue. The few known species are confined to the warm portions of both the Old and the New worlds. The flamingo of Egypt is one of the best known. The American flamingo formerly lived in Florida and along the Gulf Coast but it is now largely confined to the Bahamas and other West India Islands.

These birds stand five feet high and are bright crimson with black wings, yellow legs and yellow bill with black tip. The nest is in the form of an inverted cone, 6 to 20 inches in height, made of sand or mud, with a depression in the top in which one or two white eggs are laid. The nesting sites are flat tracts of land near the shore, which are usually more or less under water. When incubating, the flamingos sit on the nest by doubling their long legs under them. The old story of the flamingo straddling the nest has been abundantly disproven by several competent authorities. The young flamingos are downy, with long legs and a straight bill which becomes curved before the birds are fully grown.

Flan'ders, a portion of eastern Europe which once included only the city of Bruges and vicinity; later the name was indefinitely applied to the coast region from Calais to the Schelde, and is still retained in two provinces of Belgium.

West Flanders. This province is a triangular district, having 40 m. of coast on the North Sea; it is bordered on its remaining boundaries by Zealand, East Flanders, Hainaut and France. The soil is fertile, and agriculture and fishing are the chief occupations. The principal cities are Bruges, its capital, and Ostend. Its area is 1263 sq. m. Population, 881,033.

East Flanders. Completely inland and east of West Flanders lies the Province of East Flanders. This is an even more fertile country than its sister province, and the district of Waes, only recently reclaimed, is said to be the most productive section of Europe. Market gardening is the chief industry. Ghent, the capital, is the principal city, and St. Nicolas and Alost are also important. The area is 1172 sq. m. Population, 1,123,705.

Flatfish. See Flounder.

Flathead, a tribe of Pacific Indians whose name has been derived from their custom of flattening the skull by pressure constantly applied to the head of the infants. The custom no longer prevails, but the name is still applied to the tribe.

Flax, an extensively grown, branching herb of the Flax Family from whose fibers linen is manufactured, and from whose seeds linseed oil, oil cakes and medicines are made. The plants are grown in wide tracts like grains, and are beatiful plants either when seen in mass or examined as individuals. The stems, which grow to a height of one to two feet, are slender and somewhat branched near the top. The leaves are undivided, stemless and rather inconspicuous. The flowers are borne in erect clusters at the ends of the branches and are generally of a delicate blue color, though some species bear white flowers. They bloom

FLAX

in June or July. Each individual flower has five sepals and five petals which spread widely. The seeds are thin, shiny brown in color and contain a great percentage of oil, which is the basis of the linseeed oil of commerce.

No other plant which is not a food producer is more extensively cultivated. It is mentioned in earliest sacred and profane history, and was evidently grown for its fiber, and treated to much the same process as we treat it now, to produce the "linen raiment white as snow" which was then, as now, the favorite garb of all classes. It has been grown in Egypt for many centuries and is also a staple crop of Russia, Belgium and Ireland. In the United States it is grown in the Central Western States with great success but requires constant care and attention. The name linen is derived from the classical name of the flax and means thread or fiber. See LINEN; LINSEED OIL; WILT.

Flax'man, John (1755-1826), the leading sculptor of the English School, was born at York, the son of a modeler. He studied at the Royal Academy and was engaged in the pottery works of Josiah Wedgwood, after which he worked in Rome contemporaneously with the sculptors Canova and Thorwaldsen and the critic Winckelmann. Among his greatest works are illustrations of Homer's *Iliad* and *Odyssey* and of the works of Æschylus and Dante, the sculptured *Cephalus* and *Aurora* and the monument to Lord Mansfield.

Flax'seed", a valuable seed obtained from the flax plant and used in the production of linseed oil. The crop is an important one in the United States, where 14,657,000 bushels were produced in 1919. Almost the entire amount came from the Dakotas and Minnesota. The seed is thrashed by means of a special thrasher and is pressed to remove the fats and oils in which it is rich. After 72 per cent of the oil is expressed, the remaining mass is pressed into cakes or ground into meal to be sold as fodder. In medicine, flaxseed is used in making poultices and other soothing applications.

Flea, an insect once classed among the flies in the order Diptera, but now placed in a separate order, Siphonaptera, or tube-winged. During the adult stage fleas are parasitic upon Mammals and birds. They are then wingless insects, with narrow bodies which enable them to pass between the hairs of the coat of such shaggy animals as dogs and cats. The eggs are generally deposited in heaps of decaying matter, where the larvæ, when hatched, may find plenty of food. The adult develops in about two weeks.

There are several species which are known according to the host upon which they live. The eggs of the human flea are laid in cracks in the floor or under the edges of carpets and take a month to develop to the adult stage. The larvæ are small white worms without eyes or legs. The rat flea, which is native in tropical regions, is said to be the carrier of the germs of bubonic plague brought into subtropical and temperate climates by rats.

Domestic animals troubled with fleas should be daily washed with carbolic soap; their cushions or mats daily beaten out of doors; and any suspected places where eggs might be deposited should be treated with pyrethrum, or Persian insect powder. Heaps of rubbish and decaying animal or vegetable matter are choice repositories and should not be allowed to stand uncovered. See JIGGER; INSECTA; INSECTICIDE.

Fleabane, *Flee' bane,* a familiar member of the Composite Family found wild on moist, low ground or, in some species, cultivated as a garden plant. In general the fleabanes are weeds which grow to a height of about two feet and have erect, leafy stems. Often a cluster of large, coarse leaves forms a circle upon the ground at the base of the stems, while those on the stalks clasp them tightly. The flowers are much like those of the wild aster; there is a cluster of leaflike, pointed scales called an involucre, which surrounds the flat disk of blossoms. Around the edge of this disk are many short, threadlike rays, purple or white in

color and resembling petals. Upon the disks the tiny florets are yellow and tubular in form. Fleabane grows everywhere throughout the United States and its flowers may be seen from spring until fall in meadows and near swampy grounds. There is one shrub belonging to this same class growing wild in Oregon. It is more showy than the commoner fleabanes and is occasionally made use of as a lawn shrub.

Flem'ing, Sir Sandford (1827-1915), a Canadian engineer and scientist, born in Scotland. He came to Canada in 1845 and by 1857 was chief engineer of the Northern Railway, Toronto. In 1863 he went to England to urge the opening of railway communications between the Red River and eastern Canada, and on his return he surveyed for a first link in a road from the Atlantic to the Pacific. He was chief engineer of the Intercolonial Railway during its construction. Meanwhile he had surveyed for the Pacific and had led an expedition through the Rocky Mountains by way of the Yellowhead Pass. Besides, at his own expense, he had examined Newfoundland for possibilities of establishing a line across that island. Subsequently he conducted for the local government a survey from St. John's to St. George's Bay, which resulted in the building of a road there, and in 1883 he returned from Europe to assist in establishing the Canadian Pacific by its present course through the Rockies.

Among other subjects which have engaged Sir Fleming's attention is that of making the prime meridian of universal time at Greenwich the standard for the world, and that of electric girdling of the globe, by which the various English possessions could be brought into unbroken telegraphic communication without crossing foreign soil. For furthering this latter plan, the first step is the Pacific cable, in connection with which Sir Fleming proceeded to Australia and England in 1893 and to London in 1896. Another of his important works, which tends towards the consolidation of the empire, was the erecting of the Halifax Memorial Tower, commemorating the origin and benefits of representative government. Since 1880 he has been chancellor of Queen's University, where the engineering building bears his name. Most of his writings have been on professional subjects.

Fletcher, John. See BEAUMONT, FRANCIS and FLETCHER, JOHN.

Fleur-de-Lis. See IRIS.

Flick'er, a bird of the Woodpecker Family. The flicker is considerably larger than the robin (13 inches long). It is brownish or grayish, with spots and bars of black on the back and under parts; there is a red band across the back of the head; a crescent-shaped black spot on the breast; and in the male, a black streak on each side of the cheek. The shafts and under parts of the wings and tail are bright yellow and the rump is pure white. The flicker, or yellow-shafted woodpecker (also called high-hole, pigeon woodpecker, pigeon hawk, yellow-hammer, yarup and thirty other names), is the only woodpecker which habitually perches crosswise on a limb and feeds on the ground. During the courting season the male beats a loud tattoo on a resonant limb, besides having a shrill call, which sounds like "wick, wick, wick." The nest is made in a hole in a tree and contains five to nine white eggs. Ants constitute a large part of the flicker's food.

Flint, a massive variety of quartz resembling chalcedony, but darker in color. It is found usually in chalk formations in the form of nodules or rounded lumps, notable occurrences being in the chalk cliffs of England and France, and in the cretaceous limestones of the United States. Flint is very hard and produces a spark when struck with steel. It has been used from the earliest times as a source of fire and by primitive peoples for making sharp implements, such as arrowheads, axes and knives. Its chief use at the present time is as an ingredient of fine pottery.

Flint, Mich., a city and county seat of Genesee Co., 68 m. n.w. of Detroit and 34 m. s.e. of East Saginaw, on the

Flint River and on the Grand Trunk Western, the Pere Marquette and other railroads. There is an excellent city electric system, and the Detroit United Railway and other interurban lines connect with Detroit and the near-by towns and cities. Flint has an area of over 12 sq. m. and is situated in an agricultural and coal-mining region. The city ranks high among the cities of the state in the value of its manufactures.

Parks and Boulevards. The city contains many miles of broad, well-paved and shaded streets and boulevards. There are about nine public parks included in the park system.

Public Buildings. Among the noteworthy buildings are a courthouse, city hall, Federal Building, Y. M. C. A., Vehicle Club Building, a number of banks, theaters, good business houses and about 25 churches.

Institutions. The educational institutions include the Michigan School for the Deaf, established in 1854, a high school, several business colleges, a parochial school, about 20 public schools and a public library. Among the benevolent and charitable institutions are the Huxley Public Hospital and the Oak Grove Hospital, a private retreat for the insane.

Industries. Flint has important manufacturing interests and is known as the "Vehicle City" on account of its extensive manufacture of vehicles. Several large automobile plants are located here. The city also contains manufactories of motors, carburetors, flour, woolen goods, cigars, wheels, paint and varnish, iron goods, bicycles, brick and tile and lumber products. The city has sawmills and several extensive coal mines are located within half a mile. The grain trade is of considerable importance.

History. The first settlement was made in 1820 and the place called the Grand Traverse of the Flint. Since the establishment of the vehicle industry in 1869 and especially since 1886 the city has had a rapid and continuous growth. Flint was incorporated as a village in 1831 and chartered as a city in 1855. Population in 1920, 91,599.

Flintlock, an army musket in which the spark to ignite the powder was struck from a flint. In this lock the flint was secured to the hammer in such a manner that when it was released by pulling the trigger the flint struck the battery of the powder pan and a spark from the flint ignited the priming, which passed its fire on through the touchhole to the charge, so firing the gun. In the early part of the 19th century the percussion cap took the place of the flint and powder pan.

Flod'den Field, a plain in Northumberland, England, at the base of Flodden, the northeastern spur of the Cheviot Hills. Here on Sept. 9, 1513, the Scotch under James IV were defeated by an English army commanded by the Earl of Surrey. By a daring march to the rear of the Scotch, Surrey placed his troops where victory for either side meant utter defeat for the other. The Scotch were beaten only after a stubborn contest, and among the 10,000 left dead on the battlefield were the leading men of the country, who had rallied to the support of their king. In *Marmion* Scott gives a description of the battle.

Flood Plain, a low land area lying along a river's banks, formed in times of inundation by depositions of eroded material transported by the stream from higher lands in the upper part of its course. The flood plain may lie either at the mouth of a river or may occupy some part of its course. If it occurs near the middle or in the upper course of the stream, it is usually narrow and composed of coarse sand and gravel; but if formed at the mouth of a river it is usually of fine silt and exceedingly fertile. Flood plains are extensively cultivated and usually thickly settled, but are in constant danger of floods. Notable examples of flood plains are in the valleys of the Mississippi, the Rhine, the Nile and the Ganges. See River; Delta.

Flo'ra, Roman goddess of flowers and spring, beloved by Zephyrus. Her festival, the Floralia (Apr. 28 to May 1), was observed in Rome from most ancient

times, and with a great deal of mirth. Flora is considered by the poets to be the same as the Greek Chloris. On coins she is represented with a crown of flowers.

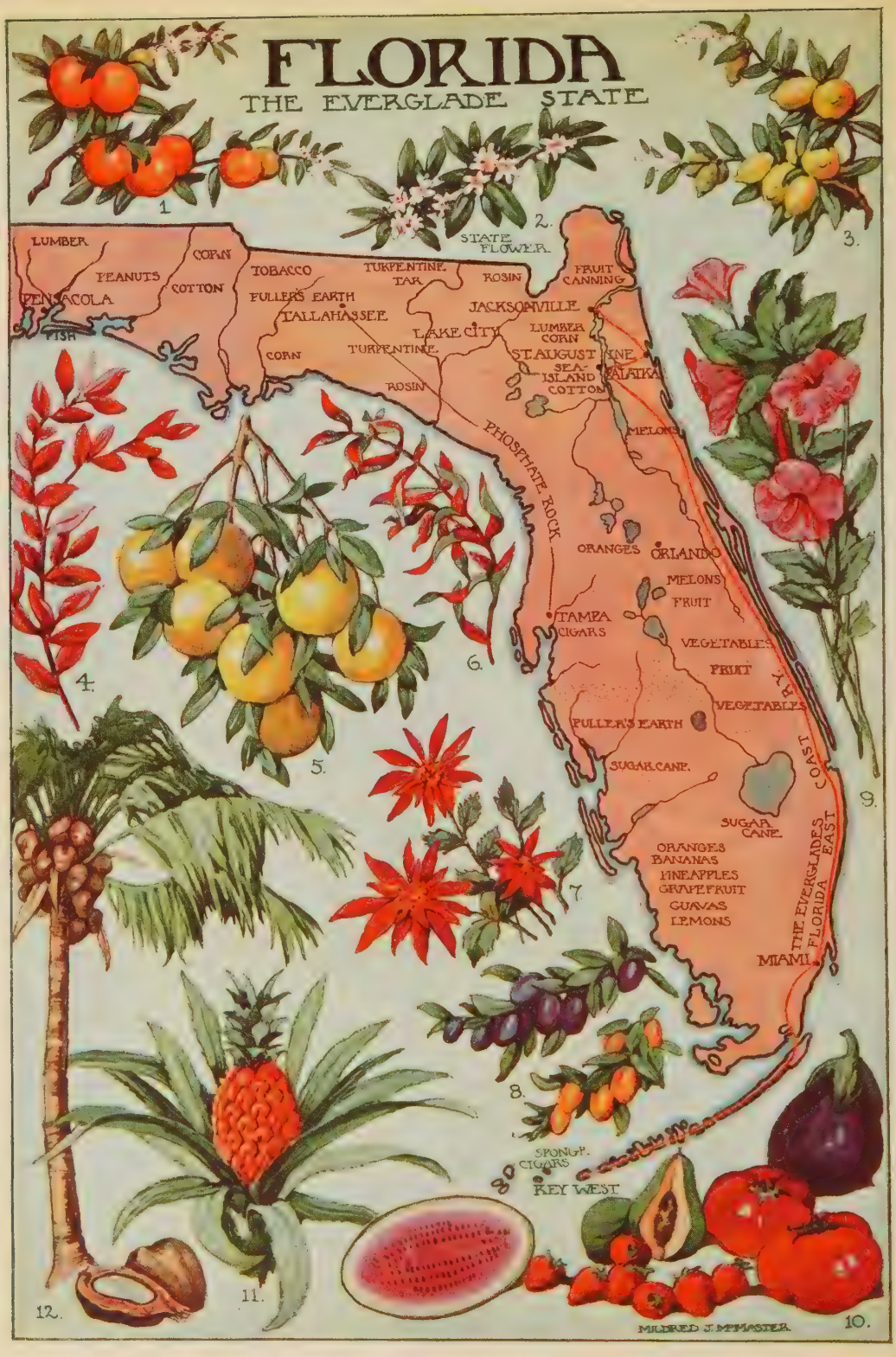
FLORA

Florence, a city of Italy, the former capital of Tuscany, now of the Province of Florence, situated on both banks of the Arno River, 140 m. n.w. of Rome. The valley in which it lies, bordered by the spurs of the Apennines, is broad and fertile, and the hillsides are covered with vineyards, olive groves and orchards, or dotted with the white villas of the attractive suburbs. The city is justly called "Florence the Beautiful." The streets are clean and the general sanitary conditions are satisfactory. Several of the squares, famous for their artistic or historical association, are still beautiful. The Florentine churches are very numerous. The most important is the Duomo, completed by Brunelleschi, which has the largest dome in the world. The Campanile, begun in 1332 and designed by Giotto, is magnificent, light and airy, and its bell tower is unequalled by anything of its kind. The other churches are likewise distinguished for architectural beauty and splendor of design.

Four large libraries contain valuable collections of books, manuscripts, prints and drawings. The art galleries, chiefly the Uffizi, the Pitti and the Accademia, contain treasures of works of art, among others masterpieces by Raphael, Botticelli, Andrea del Sarto, Fra Angelico, Donatello, Michelangelo and the Lippi. As the center of Italian science and art, there are several schools and academies, including the ancient university now known as an Institute of Higher Study, a higher gymnasium, a school for notaries, several art schools, a conservatory of music and a higher training college for women. The industries are not important, the manufacture of art products, especially the Florentine mosaics of colored marbles, being the only one of note. There are also porcelain, glass and jewelry works. Wine, oil and grain are supplied from the agricultural region of which Florence is the center.

The city was probably founded in the second century B. C. The strife between different factions that sprang up in the 13th century was long and insistent. Florence was the center of the Renaissance movement, and the home of the martyr Savonarola. It has produced a large number of illustrious men; in addition to the artists mentioned are the names of Dante, Boccaccio, Petrarch, Galileo, Americus Vespucius and Machiavelli. It was made the capital of the new Kingdom of Italy in 1865, but in 1871 it was replaced by Rome. Population 250,000.

Florence, Ala., a city and the county seat of Lauderdale Co., 126 m. s.w. of Nashville, Tenn., on the Tennessee River, at the foot of the Muscle Shoals



1. Oranges
2. Orange Blossoms
3. Lemons
4. Croton Bush
5. Grapefruit
6. Calipha Bush
7. Poinsettia
8. Kumquat
9. Hibiscus
10. Vegetables
11. Pineapple
12. Coconut

Canal. Railroads entering the city are the Southern, the Louisville & Nashville and others; an electric railway connects with Sheffield and Tuscumbia, and further transportation facilities are provided by river steamboats. Ample water power for manufacturing is supplied by the river, and the factory products include pig iron, boilers, wagons, stoves, engines, wooden pumps, cotton yarns and cloth, cottonseed oil, fertilizers and staves. Mining and lumbering are important industries. It is the seat of a state normal college, of the Florence University for Women and of the Burrell Normal School (colored). The city was founded in 1818, and among the earliest property holders were Andrew Jackson and James Madison. During the Civil War Florence was several times raided by the Federal troops. The place was chartered in 1889. Population in 1920, U. S. census, 10,529.

Florence, S. C., a city and the county seat of Florence Co., 41 m. n.e. of Charleston, on the Atlantic Coast Line and other railroads. It is situated in a productive farming region devoted chiefly to the cultivation of cotton and tobacco. The principal industrial plants are for the handling of the products of the two crops, tobacco stemmeries, drying plants, cotton gins, cottonseed-oil mills, cotton and tobacco warehouses being the most important. There are also in the town lumber mills, railroad repair shops and machine shops. The city has a fine Federal Building and is the seat of a state industrial school. Population in 1920, U. S. census, 10,968.

Flo'ricul"ture. See AGRICULTURE.

Flor'ida, THE EVERGLADE STATE, also *The Peninsula State,* one of the South Atlantic States, is bounded on the n. by Alabama and Georgia, on the e. by the Atlantic Ocean, on the s. by Florida Strait and the Gulf of Mexico and Alabama. The Perdido River forms the extreme western boundary.

SIZE. The length from north to south is 400 m. and from east to west 350 m. The average breadth of the peninsula is about 100 m. The area of Florida is 58,666 sq. m., of which 3805 sq. m. consist of lakes, rivers and lagoons. The coast line is about 1400 m. Florida is a little smaller than Georgia, larger than Illinois, almost the exact size of Michigan and the 21st state in area.

POPULATION. In 1920 the population was 968,470. From 1910 to 1920 there was a gain in population of 215,851, or 28.7 per cent. There are 17.7 inhabitants to the square mile and the state's rank in population is 32.

SURFACE. Along the Alabama boundary the surface is rolling and hilly, but the land descends to a low level plain along the coast. A low ridge extends nearly the entire length of the peninsula, forming a divide that separates the rivers flowing into the Atlantic from those flowing into the Gulf. The highest points in this divide are in the north, where they attain altitudes ranging from 100 ft. to 300 ft. Between the coast and the divide the land is low and level, containing many lagoons and lakes. The southern part of the peninsula consists of the Everglades, a swamp having an area of 3600 sq. m. A portion of this has now been drained. A chain of islands known as the Florida Keys extends along the coast to the southwest. Key West is the most important island of the group.

RIVERS AND LAKES. The St. Johns River, rising in Brevard and Osceola counties and flowing northward through the series of lakes, is the largest river. It is navigable for more than 250 m. The St. Mary's forms part of the northeastern boundary and flows into the Atlantic. The principal streams flowing into the Gulf of Mexico are the Suwanee, the Caloosahatchee and the Escambia.

Florida has a large number of lakes, most of them located at the foot of the slopes on each side of the divide. The largest of these, Lake Okechobee, has an area of 1200 sq. m. The state has many springs, some of which are so large that they form large-sized pools. These springs constitute a peculiar feature of the state.

CLIMATE. The location of Florida

gives the state a unique climate. Notwithstanding the latitude the summers are equable and pleasant. The winters are short and frost seldom occurs. The year is practically divided into the rainy and dry seasons, the former including June, July and August and the latter the fall and winter. Summer is said to last two thirds of the year, and Jacksonville, Miami, St. Augustine, Tampa and Key West are delightful winter resorts.

Minerals and Mining. Florida contains extensive deposits of phosphate rock of excellent quality for making fertilizers. The most valuable beds are along the coast from Tallahassee to Tampa. The mining of this rock is the chief mineral industry and Florida ranks first in this production. Most of the fuller's earth found in the United States is also obtained in Florida.

Forests and Lumber. Florida has extensive forests of live oak, hickory, long-leaved pine, pitch pine, red cedar used in the manufacture of lead pencils, and cypress. The state is said to have a greater variety of trees than any other in the Union, and some trees peculiar to itself. Among these are the wild orange, the coconut and the satinwood. Lumbering and the production of tar, rosin and turpentine constitute the leading manufacturing industries, the annual output of all forest products amounting to about $30,000,000.

Agriculture. The soil is rich in phosphate and humus. Consequently it has a high degree of fertility. This combined with the abundant rainfall assures the farmers of luxuriant growths of whatever is planted. Corn and other cereals are raised for home consumption, but most of the farm products are semitropical. Florida is the first state in the Union in the production of pineapples and cassava. Lemons, oranges, limes, olives, grapefruit, Japanese plums, cocoanuts and bananas are grown extensively for the Northern markets. Sugar cane, sea-island cotton, peanuts, garden vegetables, melons and sweet potatoes are also important crops. Raising watermelons for seed is a profitable industry.

Fisheries. Florida has the most important fisheries of any state south of Virginia. This is due largely to the extent of the coast line and the large inland lakes. The red snapper is the most valuable fish taken. The shad, mullet and marine turtles are also taken in large quantities. Oyster beds are cultivated in some localities and there are extensive sponge fisheries in Florida Keys, having their center at Key West. In all, the fisheries give employment to about 9000 men, and the total yearly income is about $3,400,000.

Manufactures. The manufacture of lumber and lumber products and the production of tar, rosin and turpentine constitute the leading manufacturing industries. These industries center about Jacksonville and Pensacola. Next in importance is the manufacture of cigars. Key West is the center of this industry, which employs about 7000 people. Most of the tobacco is obtained in Cuba. The third industry is the manufacture of fertilizers, centered in and about Tampa. Minor industries include the manufacture of wooden boxes, barrels, sirup and sugar cane, cottonseed oil and meal, and the canning of pineapples and guavas.

Transportation and Commerce. The extensive coast line furnishes numerous good harbors. The St. Johns, Appalachicola, Suwanee and St. Mary's rivers are navigable for smaller craft. Jacksonville, Pensacola, Tampa and Key West have direct steamer connections with New York, Philadelphia, Boston and other maritime cities, and Key West is connected with Havana, Cuba, with a special line of steamers. The Atlantic Coast Line, Seaboard Air Line and West Florida railways all have lines reaching all the principal cities, and the French East Coast Line has a remarkable extension over the Florida Keys to Key West.

The state has a large export trade, sending the Northern markets its fruits and vegetables and its lumber and naval stores. The imports consist of such manufactured articles and foodstuffs as cannot be produced with profit within the state. Jacksonville, Pensacola, Tam-

pa and Key West are the chief seaports, and Key West has an extensive trade with Cuba.

GOVERNMENT. The present constitution was adopted in 1886. The governor is elected for four years and is not eligible for immediate reelection. In case of vacancy in the governorship the president of the Senate becomes governor. The Legislature consists of a Senate of 32 members chosen for four years and a House of Representatives of 68 members chosen for two years. Sessions of the Legislature are biennial and limited to 60 days. There was a local option law which regulates the liquor traffic by counties.

The judicial department comprises a Supreme Court consisting of one chief justice and five associates chosen for six years; also Circuit, Criminal and County courts and local courts presided over by justices of the peace.

EDUCATION. Florida has the benefit of a school fund derived from school lands, the 16th section of every township being set apart for this purpose. This fund is supplemented by local and state taxation. Within the last few years remarkable progress has been made in the development of the public school system. Separate schools are maintained for white and colored children. Towns and cities have good systems of graded and high schools. The University of Florida (for men) is located at Gainesville. In connection with it are the agricultural college and the state normal school for men. The Florida State College for Women is located at Tallahassee, and in connection with it is the state normal school for women. The agricultural and mechanical college for negroes is situated at Tallahassee. There are a number of colleges and secondary schools supported by various religious denominations.

STATE INSTITUTIONS. The hospital for the insane is at Chattahoochee and the home for Confederate soldiers and sailors at Jacksonville. The institute for the blind and dumb is at St. Augustine. There is a state juvenile reformatory at Marianna. The state convicts are maintained in camps instead of at a state prison.

CITIES. The chief cities are Tallahassee, the capital; Jacksonville, Tampa, Pensacola, Key West and Miami.

HISTORY. Florida, from the Spanish *flowery*, was so named because on Easter, 1513, Ponce de Leon, the Spaniard seeking the fountain of youth, rediscovered Florida. Narvaez and De Soto roamed the country with dismal fate. Later French Huguenots vainly attempted settlements on the St. Johns River. In 1565 their second colony was massacred by the Spanish explorer Menendez. He then established St. Augustine, the first permanent settlement in North America. Two years later Gaston de Gourgues revengefully surprised the Spanish colonists, who were also attacked by English and Indians. Pensacola was founded by Spaniards in 1699.

By the treaty of 1763, England obtained East and West Florida; by that of 1783 Spain regained it. She sold all Florida, which has long been a retreat for outlaws and for fugitive slaves, to the United States, in 1819, for $5,000,000. In 1845 it entered the Union. Previously, 1842, the Seminoles, against whom war had been waged since 1835, were given lands west of the Mississippi.

Seceding in 1861, Florida captured Ft. Madison, the arsenal at Chattahoochee, besides the forts and navy yards of Pensacola. The next year Union soldiers captured Jacksonville, Fernandina and St. Augustine. In 1865 the ordinance of secession was annulled, and Florida's debts, incurred for the Confederacy, were canceled. In 1868, having adopted the Fourteenth Amendment, it was again declared a state of the Union. The state has recovered from the effects of the Civil War, and is making rapid progress along all industrial lines.

GOVERNORS. William D. Moseley, 1845-1849; Thomas Brown, 1849-1853; James E. Broome, 1853-1857; Madison S. Perry, 1857-1861; John Milton, 1861-1865; William Marvin, 1865; David S. Walker, 1865-1868; Harrison Reed,

1868-1872; Ossian B. Hart, 1873-1874; Marcellus L. Stearns, 1874-1877; George F. Drew, 1877-1881; William D. Bloxham, 1881-1885; Edward A. Perry, 1885-1889; Francis P. Fleming, 1889-1893; Henry L. Mitchell, 1893-1897; William D. Bloxham, 1897-1901; William S. Jennings, 1901-1905; Napoleon B. Broward, 1905-1909; Albert W. Gilchrist, 1909-1913; Park Trammell, 1913-1917; S. J. Catts, 1917-1921, and C. A. Hardee, 1921—.

Florida, Gulf of, Florida Straits or **Bahama Channel,** the narrow channel connecting the Gulf of Mexico with the Atlantic and separating Florida from the West Indies. It is 300 m. long and about 100 m. wide.

Florida Keys, or **Florida Reefs,** a succession of coral islands or reefs extending from Cape Florida for 220 m. in a southwesterly direction into the Gulf of Mexico. Key West, one of the largest, has the city of Key West upon it, and a long railway, built from key to key, connects this with the mainland. Among the other important keys are Key Largo, Saddle Bunch Keys, Key Vaccas and Elliotts Key.

Florida State College for Women, at Tallahassee (1905). This was the first state college for women in America. It was opened in 1905, and its enrollment exceeds 300. Its location also, at the capital of the state, has given it prominence, as in the case of the state universities of Minnesota, Wisconsin, Ohio, Nebraska, Utah, Texas, South Carolina and Louisiana. The library contains about 10,000 volumes. The institution's total receipts exceed $100,000 a year. See FLORIDA, UNIVERSITY OF; WOMEN, COLLEGES FOR.

Florida, University of, at Gainesville (1903). Established at Lake City in 1884 as the Florida Agricultural College, this institution was chartered as the state university in 1903, and removed to Gainesville in 1905. Courses have been established in languages and literature, general science, engineering and education. In connection with it are the Florida Agricultural College and State Normal School. Like three older state universities, those of Virginia, Louisiana and Georgia, this institution is open only to men. However, in 1905 the people of this state made provision for the education of women (See FLORIDA STATE COLLEGE FOR WOMEN). There are about 50 members in the faculty and the enrollment exceeds 300.

Flotow, *Flo' to,* **Friedrich von** (1812-1833), a German composer, born at Teutendorf in Mecklenburg. Intended originally for the diplomatic service, his passion for music altered the parental plans, and he was sent to Paris to study under Reicha. The value of his compositions lies in their irresistibly melodious quality. His operas are frequently heard, *Martha* and *Bob Roy* being universal favorites.

Flot'sam and Jet'sam, in English law, terms applied to goods lost in the wreck or danger of a ship at sea. Flotsam was originally applied to such goods as floated ashore, and jetsam to those that sank with the ship. More recently the terms have been applied respectively to goods washed overboard and to those thrown overboard to lighten the ship. The term *ligan* is applied to goods that sink with the ship when they are attached to a buoy or some other object in order that they may be recovered. Unless recovered by the owners, goods in all these classes belong to the crown.

Floun'der, or **Flatfish,** a large family of carnivorous fish, containing some of the most important food fish. Flounders are easily recognized by the peculiar twist of the cranium which, when the fish are about three months old, has brought both eyes upon the same side of the flat, elliptical body. In all species these eyes are large, rather far apart and located upon the right side. The left side, called the blind, or naked, side, is light-colored, in distinction from the right side, which is brilliantly marked There are over 50 genera including 500 species, found upon sandy bottoms from Arctic regions to the tropics. The American flounder is well known to the fisher lads of the Atlantic coast, for it is a fish

which will take any bait and is easily captured through the ice. Other members of the family are the halibut, turbot, four-spotted flounder, starry flounder and pale flounder. The United States Fish Commission has given much attention to the propagation of many species of this family. See HALIBUT.

Flour, the finely ground and bolted meal of wheat. When the term is applied to the meal of other grains, the grain is specified, as rye flour and buckwheat flour. Graham flour, or graham, is the unbolted flour of wheat and contains all the ingredients obtained in grinding the grain. The earliest method of grinding the grain was very crude, and the first form of a mill was one in which a bed stone was held in a frame, on top of which revolved a runner stone having an eye in the center through which the grain was fed. This top stone was revolved by means of a long lever or sweep, to which draft animals were hitched. Later, water power was applied, and in Holland and New England, power from windmills was used for many years. Mills of this character crushed all parts of the grain, and various forms of sifters were employed to separate the flour from the bran and other impurities.

FLOUR MILLING. Flour milling is now carried on as follows. The wheat is unloaded from the cars into pits, which are provided with elevators consisting of metal buckets riveted to a belt running around pulleys. These elevators carry the wheat to the top of the building and empty it into suitable bins, from which it is spouted out through a machine to separate the oats, chaff and light dirt from the wheat, and afterwards through a cockle separator, the cockle being a rough, black seed which darkens the flour. From this machine the wheat is fed into a smut machine, which brushes from the end of the kernel, a fuzz which holds a dark-colored dust in its folds. From the smut machine the wheat is delivered into a chute, where powerful electromagnets are arranged to catch all metallic particles, such as nails, tacks and pieces of wire that may have fallen into the wheat from the harvester or thrasher. The wheat is now fed into a steamer, where it is slightly cooked preparatory to grinding.

Grinding is done by chilled-iron rolls, of which there are five sets. In the first set the spiral corrugations on the rolls are comparatively coarse, in order that the wheat may be simply broken open, and the other sets gradually reduce the wheat to finer and finer particles as the corrugations grow smaller and smaller. At each break the crushed particles are carried to a middlings purifier and a variety of machines, known as bolters, sifters and scalpers, to get out the bran and offals of the flour. The flour is then led to the lower story of the mill and cooled by cold-air blasts, and finally fed into a machine which packs and weighs each bag or barrel, as the case may be. It is very important that all dust be taken out of the building lest it explode, and fans arranged on the suction principle are provided for this purpose.

A barrel of flour weighs 196 lb. and is the product of about five bushels of wheat. The sacks are made to hold a half barrel, quarter barrel and eighth barrel, so that customers can purchase their flour in large or small quantities. The great milling centers are naturally in or near the chief wheat-growing centers. Minneapolis, Minn., is the largest milling center in the world. Some of the mills there have a capacity of 15,000 barrels in 24 hours, and the combined capacity of its mills exceeds 60,000 barrels a day. Smaller mills, with capacities varying from 100 to 1000 barrels a day, are common throughout the wheat-growing regions of the United States. See WHEAT.

Flow'er, a highly specialized leaf whose office is the production of seeds. The essential parts of a flower, or those necessary to this function, are the stamens and pistils. Flowers having both of these parts are said to be perfect. These parts, however, are generally surrounded by floral envelopes, or the attractive members, consisting of a calyx and a corolla. Flowers which possess

all of these parts are said to be complete.

The typical, complete flower has its parts arranged in whorls: the calyx, or outer whorl, generally green in color and often made up of separate divisions called sepals; the corolla, the next whorl within, ordinarily brightly colored and also often made up of separate parts called petals. These whorls together are called the perianth. If one circle of the perianth is lacking, the remaining circle is called the calyx. Within the petals is the circle of the stamens, which are made up of two parts: the filament, or

PARTS OF A FLOWER
1, Stamen; 2, petal; 3, pistil; 4, sepal.

threadlike stem; and the anther, or case containing the pollen, or fertilizing dust. At the center of the flower is the pistil or pistils made up of three parts: the ovary, a thickened, hollow portion at the base, containing the ovules, or undeveloped seeds; the style, or stalk at the top of the ovary; and the stigma, a naked surface for receiving the pollen.

The entire flower is borne upon an enlarged portion of the stem called the receptacle. A general numerical plan is noticeable in most flowers, for usually all of the whorls are divided into the same number of parts or into multiples of that number. For example, the members of the Lily Family have their parts in threes or multiples thereof, and those of the Mustard Family in fours. Other families have fives, and so on.

Flowers vary greatly from this type form, modifications having come about through adaptation to different modes of life. Imperfect flowers are flowers which lack either stamens or pistils, the former being called pistillate and the latter, staminate. If staminate and pistillate flowers are borne upon one plant the flower is said to be monœcious; if upon separate plants, diœcious.

Incomplete flowers lack one or both of the flower envelopes and are then called apetalous flowers or naked flowers. Irregular flowers have the members of some or all of their whorls unequal or dissimilar, and unsymmetrical flowers have their whorls differing in number of members. Since many flowers depend for cross-fertilization upon the assistance of the wind or of insects, which carry the pollen of one flower to the pistil of another, the attractive apparatus is designed to entice the insects which can best do this work. See CROSS-FERTILIZATION.

But though it may be said that scientifically the chief object of the flowers is the production of seed, it should also be granted that they fill unconsciously an important place in the world of man; their beauty, fragrance and brightness have borne many a message of consolation and cheer, and have surely been responsible for many a kinder thought, a lightened heart and a renewed courage.

Spake full well, in language quaint and olden,
One who dwelleth by the castled Rhine,
When he called the flowers, so blue and golden,
Stars, that in earth's firmament do shine.

In all places, then, and in all seasons,
Flowers expand their light and soul-like wings,
Teaching us by most persuasive reasons,
How akin they are to human things.
—Longfellow, *Flowers.*

Flowering Moss. See PYXIE.

Flowers, Artificial, imitations of natural flowers, made of a variety of materials and used for scientific and decorative purposes. The art of making artificial flowers was known centuries before the beginning of the Christian Era, and, so far as known, papyrus bark and

silk were the materials first used. The Greeks and Romans made wreaths of silver and gold, and the peoples of the Middle Ages used various materials. The most delicate artificial flowers of the present time vary widely in material and structure, according to the regions in which they are made, those from South America being made of the brilliant plumage of native birds, those from China and Japan consisting largely of rice paper and silk, and those from the Bahama Islands being fashioned from delicately tinted shells.

Artificial flowers are used chiefly in the United States for decorating women's headgear, and for this purpose they are manufactured on a large scale and of comparatively cheap materials. The industry is carried on most extensively in France and the United States. Flowers made for scientific purposes must be accurate representations of those which they represent, and their manufacture requires a high degree of skill, and a knowledge of botany as well. One of the most noted collections of artificial flowers is that of Harvard University, which represents the flora of the United States. The flowers are made of glass.

Flowers, Language of, an ancient method of communication, which has lingered even to these more practical days and which gives to plants and flowers certain meanings, so that by them messages may be conveyed. Its origin, though historically uncertain, is probably to be found in the era that peopled groves and streams with nymphs and fauns, and enclosed in each tree and flower its separate dryad. Since Narcissus, viewing his beautiful face in the stream, admired it so greatly that he was transformed into the flower that bears his name, the narcissus has been the emblem of vanity; Daphne, who was changed into the laurel, was wooed by Apollo, the god of music, and his faithfulness in always wearing laurel leaves upon his brow has made them the symbol of musical and poetical ability; Minerva, the goddess of wisdom, created the olive and made it the emblem of peace.

Thus many of our present sentiments in regard to flowers originated in the childhood of the earth when the gods still walked with mortals, and in Eastern lands these legends are still repeated and the sentiments still retained. Without these stories, however, some flowers speak the same message to all: the violets, modesty; the rose, love; the amaranth, immortality; and the lily, purity. In the United States up to the time of the Civil War, these and other sentiments were used by gallants and lovers to convey secret communications to sweethearts, and anxiously indeed were the returned posies scanned to read the meaning of the lady's message.

One of Mrs. Sigourney's short poems tells of the lover who gave his lady a bouquet of geraniums, roses and hawthorns; the first, to signify her excellence, the second, his love and the last, his hope. She, being well versed in the floral language, took the flowers and returned to him a single rosebud to express that, though she accepted his affection, she felt herself too young to give her own. The popularity of this method of courtship led to the publication early in the 19th century of many volumes, such as *Flora's Lexicon, Flora's Interpreter* and *Newman's Illustrated Botany,* whose object was to guide youth and maid in their choice of blossoms. The few flowers which still retain their symbols have done so probably through their fitness to bear them and through their association in myth and legend, ballad and folk tale.

A few of the flowers with well-known symbols are given below:

Aloe—misfortune.
Amaranth—immortality.
Anemone—frailty.
Asphodel—death.
Crysanthemum—truth.
Cypress—sadness.
Dahlia—dignity.
Daisy—innocence.
Fennel—valor.
Forget-me-not—memory.
Geranium—excellence.
Hawthorn—hope.
Holly—forethought.
Ivy—home.

Laurel—fame.
Oak—bravery.
Oleander—prophecy.
Olive—peace.
Pansy—thoughts.
Rose—love.
Rosemary—remembrance.
Wormwood—bitterness.

Flowers, National and State, emblems adopted by or associated with certain countries and states, either because of profusion of their growth in its environs or because by their appearance and habits they seem to typify the ideals for which that country stands. Many times ancient religious ceremonies or long-forgotten customs are responsible for the choice. The following are the flowers either chosen as national flowers or commonly associated with certain nations:

Canada	Maple
Egypt	Lotus
England	Rose
France	Flower-de-luce, or Lily
Germany	Cornflower
Greece	Violet
Holland	Tulip
India	Lotus
Ireland	Shamrock
Italy	White Lily
Japan	Crysanthemum
Mexico	Cactus
Persia	Rose
Scotland	Thistle
Spain	Pomegranate
Switzerland	Edelweiss
United States	Goldenrod

In the United States nearly all of the states have chosen flower symbols, and in most cases the choice was made by vote of the public school children and was later adopted by the State Legislature. The following are the states which have chosen state flowers:

Alabama	Goldenrod
Alaska	Forget-me-not
Arizona	Cactus
Arkansas	Apple Blossom
California	California Poppy
Colorado	Columbine
Connecticut	Mountain Laurel
Delaware	Peach Blossom
District of Columbia	Nasturtium
Florida	Orange Blossom
Georgia	Magnolia
Idaho	Syringa
Illinois	Violet
Indiana	Corn Flower
Iowa	Wild Rose
Kansas	Sunflower
Kentucky	Goldenrod
Louisiana	Magnolia
Maine	Pine Cone and Tassel
Maryland	Black-Eyed Susan
Michigan	Apple Blossom
Minnesota	Moccasin Flower
Mississippi	Magnolia
Missouri	Goldenrod
Montana	Bitterroot
Nebraska	Goldenrod
Nevada	Sagebrush
New Mexico	Cactus
New York	Rose
North Carolina	Goldenrod
North Dakota	Wild Rose
Ohio	Carnation
Oklahoma	Mistletoe
Oregon	Grape
Rhode Island	Violet
South Carolina	Palmetto
South Dakota	Anemone, or Pasque Flower
Tennessee	Daisy
Texas	Bluebonnet
Utah	Sego Lily
Vermont	Red Clover
Washington	Rhododendron
West Virginia	Rhododendron
Wisconsin	Violet
Wyoming	Gentian

The goldenrod was chosen as the national flower of the United States in 1899 by a popular vote.

Floyd, John Buchanan (1807-1863), an American statesman and soldier, born in Virginia and educated at the College of South Carolina. He practiced law in Arkansas, but after 1839 served in the Legislature and was governor of Virginia. In 1857 he became secretary of war; but for ordering the transfer of arms from Northern to Southern arsenals and for various other partialities he was forced to retire in 1860. Brigadier-general in the Confederate army, he was driven from West Virginia, and senior commander at Ft. Donelson, he fled before the surrender. See FORT HENRY AND FORT DONELSON.

Fluorine, *Floo' or in,* a chemical element found in combination with calcium in fluor spar. It was isolated in 1886 by a French chemist, Moissan, and is a pale yellowish gas, almost colorless when seen in small quantities. It is one of the most active elements and readily decomposes water and unites with mer-

NATIONAL FLOWERS

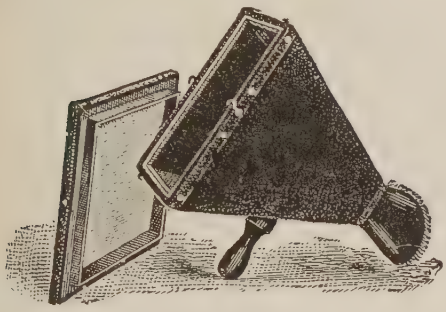
1. Pomegranate, Spain
2. Goldenrod, United States
3. Fleur-de-lis, France
4. Chrysanthemum, Japan
5. Edelweiss, Switzerland
6. Rose, England
7. Lilies, Italy
8. Cactus, Mexico
9. Kaiser-Blume, Germany
10. Thistle, Scotland
11. Sugar Maple, Canada

STATE FLOWERS

1. Violet, Illinois
2. Goldenrod, Missouri, Nebraska.
3. Apple Blossom, Arkansas, Michigan
4. Daisy, Tennessee
5. Magnolia, Georgia
6. Moccasin Flower, Minnesota
7. Peach Blossom, Delaware
8. Bitterroot, Montana
9. Mountain Laurel, Connecticut
10. Sego Lily, Utah
11. Bluebonnet, Texas

cury, so that ordinary methods of collecting it are useless. It has been found in milk, teeth, bones and the blood of animals and in small quantities in plants and volcanic rock. Its principal compound is hydrofluoric acid used in etching on glass.

Fluoroscope, *Floo or' o skope,* a fluorescent screen so arranged that radiographs produced by X rays can be examined without the necessity of using photographic plates. A fluorescent screen can be made by coating a piece of pasteboard on one side with fine crystals of calcium tungstate or of platinum barium cyanide, the crystals being bound up on



FLUOROSCOPE

the surface by wax. When such a screen is exposed to the action of X rays, preferably in a darkened room, it is rendered luminous where the X rays strike it; most strongly luminous where the X rays strike it most strongly. If the hand, or other part of the body, is held close to such a screen and between it and a source of powerful X rays, the coated side of the screen being the one farthest from the source of X rays, the rays readily pass through the pasteboard and render the screen luminous. Those parts of the screen which are shielded from the X rays by the bones of the hand are comparatively little affected; those shielded only by the flesh are more affected; while the rest of the screen is strongly affected. The resulting appearance on the screen is like a shadow, hence called a shadowgraph or radiograph, in which the shadows of the relatively opaque bones are fairly dark; those of the flesh alone are less dark or moderately bright, while the rest of the screen is uniformly bright. Metallic objects, such as finger rings or coins, show as black shadows, since metals are opaque to X rays. Glass objects are fairly opaque and show as dark shadows, while diamonds are transparent and show bright in the radiograph.

When such a screen is protected from stray light on the sensitive side by an open pasteboard box, so fashioned that its open end fits closely around the observer's eyes, it is called a fluoroscope and can be used in a well-lighted room. The cut shows the fluoroscope with the screen removed. Fluoroscopes are much used by physicians and surgeons in examining broken bones and in locating foreign substances in the body. The various organs of the body, as the heart and lungs, can be examined, since the shadows cast by the different parts of the body differ some in density. The part of the body to be examined is placed between the source of X rays and the fluoroscope, which the observer moves about until he can get a satisfactory radiograph of the part in question and judge what the trouble is. See X Ray.

Fluor Spar, a crystalline compound of calcium, found in connection with ores of tin, lead, silver and cobalt. It forms in cubical crystals that are of yellow, green, red or blue color, or are sometimes almost colorless. It is a source of hydrofluoric acid and of fluorine, and is used in metallurgy to aid in fusing ores.

Flute, a musical wind instrument, usually made of wood, sometimes of metal. It consists of a hollow tube or cylinder about two feet in length, with from six to twelve lateral keys and a lateral mouthpiece. It has a compass of nearly three octaves and is one of the most important instruments for the orchestra, being frequently used for solo parts in delicate lyrical passages.

Flux, a material used to advance the fusion of minerals or to tend to their decomposition. Many different substances are employed, depending upon

the nature of the minerals to be treated. Limestone combines with the silicates and the alumina in iron ore, and is, therefore, the flux generally employed in blast furnaces. A flux should combine with the earthy matter and impurities of the ore to form a slag, and thus act as a vehicle to set the metal free. The flux used in pottery consists chiefly of borax, red lead and sand. See BLAST FURNACE; POTTERY.

Fly, a name applied to all insects of the order Diptera; with qualifying adjectives it is used to designate numerous insects of other orders, as the May fly, sawfly, dragon fly or butterfly. Unmodified, the term is generally applied to the familiar but deadly typhoid, or house, fly. These flies constitute a family, having in common with all Diptera one pair of well-developed, nearly transparent wings and a secondary, rudimentary pair, which serves as a set of balancers in the insect's flight. The head has two prominent compound eyes made up of some 8000 hexagonal facets, or surfaces, each comparable to a single, simple eye. Aside from these there are three simple eyes on the back of the head, and with all these organs of vision it is not strange that the slightest movement startles this wary insect.

The mouth of the fly is a sucking organ, and the tongue is provided with tiny, filelike patches for rasping a surface upon which the fly wishes to feed. It is the movement of these rasps which causes the annoying sensation known as the bite of the fly. When not in use, the proboscis is folded back under the head. The legs are of medium length and angled; at its extremity each is divided into two hairy, hook-bearing pads. The hairs secrete a sticky fluid, which enables the fly to walk upon smooth surfaces and cling to the ceiling.

Flies are so numerous and so familiar to everyone that though they are considered annoying, they are looked upon as an unavoidable pest. A comparatively recent study of their habits has led to appalling discoveries, which have caused one writer to state that the fly, referring to the typhoid, or house, fly, is the most dangerous wild beast in America and causes more deaths annually than war, flood or famine. Were children taught to fear it as they fear the less dangerous snakes, many avoidable deaths would be prevented. The breeding place of the fly is wherever filth, especially decaying animal tissue, is allowed to accumulate. Here the eggs are deposited, the maggots, or larvæ, hatched and fed, and the adult insects developed. The sticky secretion upon the fly's feet picks up particles of the filth and carries them to the house, leaving them upon whatever it lights. Thus even though the fly were not dangerous, it would always be unclean. But the old habit of "shooing" the fly or only screening houses against them is now recognized as a sort of criminal procrastination, for the fly, keen for the scent of decaying tissue, haunts sick rooms and carries away germs of disease, which it spreads wherever it goes. Typhoid fever is especially liable to be so distributed, and epidemics of this disease are traceable to the now despised fly.

Many cities of the United States have organized effective campaigns for the abolishment of the fly. Notable in this respect is the city of Cincinnati, which is said to be practically flyless. When it is known that a female fly may deposit 100 eggs, which in two weeks have become adult insects ready to reproduce at the same rate, the rapid multiplication of the species is easily accounted for. One investigator, mathematically inclined, has figured that the possible progeny of the first fly of spring may, by fall, number 1,096,181,249,320,720,000,000,000,000 individuals, a mass which would exceed the total mass of the earth. Fortunately these do not all live at the same time or the earth would indeed be overrun.

To rid a place of flies many precautions should be taken. Chloride of lime or kerosene should be sprinkled over the garbage boxes which should always be kept tightly covered and emptied at least once a week. Piles of manure and other

waste should be treated in the same manner. Dirt and decaying matter should never be allowed to accumulate, since it forms a favorite breeding place. All food, especially milk, should be screened away. Fly poisons, made by putting two teaspoonfuls of formaldehyde in water or one dram of bichromate of potash in two ounces of sweetened water, may be placed in shallow dishes about the house, but should be kept out of reach of children and pets. Pyrethrum powder burned in a room stuns the flies, after which they may be gathered up and burned. Every individual fly should be captured as soon as it appears. In killing one fly, the unimaginable number of its possible descendants are thus destroyed.

When it is fully understood that flies feed upon the discharges of those sick with tuberculosis, typhoid fever, scarlet fever, diphtheria and other infectious diseases, that they carry these germs to our food, our drink, the open wounds upon our hands, the lips of sleeping children and whatever they touch upon, but that by concerted effort they may be absolutely exterminated, the campaign against the fly will become universal.

Flying Fish, a small family of deep-sea fishes of warm latitudes. They are found generally near the surface and are noticeable because of their habit of leaping into the air and spreading their pectoral fins as though in flight. These fins, however, seldom vibrate while the fish are in the air; hence it is generally considered that the fins are spread as sails rather than as wings. Since some can travel through the air for an eighth of a mile or more, it would seem that there must be, in a few species at least, the power of propelling themselves during the flight. They rarely raise themselves more than three or four feet above the water, but may travel in a straight or curved line. In falling, the tail touches the water first. All are slender, graceful fish resembling huge dragon flies when out of the water. The flying fish of the Catalina Islands is an excellent food fish. Other well-known species are the sharp-nosed and the common flying fish.

Flying Squirrel, a member of the Squirrel Family which has received its name because of a loose flap of furry skin which extends from each leg and when widespread acts as a sail or parachute. This squirrel makes its home in hollow trees where it stays by day, coming forth by night to feed upon nuts, tender shoots, eggs or even young birds. It has round, full eyes, generally rimmed with black, and a long bushy tail which, unlike that of the tree squirrel, is straight. The fur is soft and silky and has a gray-brown tone.

Foch, Marshal Ferdinand (1851-), a French soldier. He received his education at the French military college of St. Cyre, graduating as a lieutenant in 1875. For many years he was instructor in the college and nearly all French generals in the World War were among his students. He wrote two well known treatises, "The Principles of War" and "The Conduct of War." He commanded one of the French armies in the First Battle of the Marne and turned what threatened to be a defeat into a French victory, perhaps the most important of the war. He was afterwards the general in command of the British and French forces that fought the Battle of Ypres and saved the channel ports. Being regarded as the greatest strategist of the day, he was appointed generalissimo of the Entente Allied forces in March, 1918. Under his command were, ultimately, the greatest number of men ever commanded by one general. It was his continuous series of assaults along 250 miles of front that resulted in the utter collapse of Germany, November 11, 1919.

Fog, a cloud upon the surface of the earth formed by the condensation of water vapor into minute particles of water. Fog forms when the air is very moist and the water vapor in the atmosphere is condensed near the surface. Fog differs from cloud only in that it forms near the surface; it does not wet objects with which it comes in contact, nor fall as does mist. A necessary condition to the formation of fog is the presence in the atmosphere of numerous particles of

dust, the nuclei around which the water vapor condenses. The density of the London fogs is due to the abundance of dust and germs in the overlying atmosphere; and off the coast of Newfoundland, where heavy fogs are of frequent occurrence because of the conflict of cold and warm moist air currents, this land dust is present in large quantities. See CLOUD; RAIN.

Fogazzaro, *Fo"gàht sah' ro,* **Antonio** (1842-1911), an Italian novelist and poet, born in Vicenza. His writings are intensely spiritual, possess a Wordsworthian simplicity and reveal a sympathy with the Liberal Catholic Movement. He published *Miranda, Valsolda, Malombra, Daniele Cortis* and *The Trilogy of Rome,* including *The Patriot, The Sinner* and *The Saint.*

Fog Signals, signals used to warn vessels of their approach in a fog to places dangerous to navigation. Fog signals are given most effectively with bells, guns, whistles, sirens or powerful flash lights. These are an important aid to navigation, particularly because many of them are now given according to an easily understood international code. During a fog, bells can be usually heard for a distance of from one to three miles; guns and large whistles, perhaps ten miles; and sirens for 20 or 30. The sound of a movable bell, the clapper being fixed, travels farther than that of the ordinary type. From a whistle placed in a horizontal position within a reflector, it travels farther than from one in a vertical position.

The siren consists of a hollow cylinder, into which compressed air or steam is forced from one end. In the other end there are perhaps a dozen slits; and in front of this end is a disk, similarly perforated, which is revolved at any desired rate, thus permitting, say, for 2800 revolutions per minute, as many as 33,600 puffs of steam or air. A long iron trumpet, which is attached, compresses the vibrations thus originated, and directs the sound in any desired direction. To signal the engineers of railway trains in a fog, or in case of emergency, flat cases of tin, charged with detonating powder, are so placed upon the rails that the wheels of an engine must necessarily explode them. See LIGHTHOUSE.

Fo'ley, John Henry (1818-1874), an Irish sculptor, born in Dublin. He received his training at the Dublin Society of Fine Arts and at the Royal Academy of London. His earlier works are chiefly on ideal subjects, but he achieved his greatest success in his portrait statues. His statues of Hampden, Selden and Sir Charles Barry stand in the Houses of Parliament; those of Lord Hardinge, Lord Canning and Sir James Outram are in Calcutta; those of Oliver Goldsmith and Edmund Burke are in Dublin. He made the statue of the Prince Consort and the group *Asia* in the Albert Memorial of Hyde Park and designed the seal for the Confederate States during the Civil War. His last work is in America and is a statue of Stonewall Jackson, made for North Carolina. Foley was made a member of the Royal Academy in 1858.

Folk, Joseph Wingate (1869-), an American lawyer and statesman, born at Brownsville, Tenn., and educated at Vanderbilt University. He settled in St. Louis. When the great street car strike in 1900 paralyzed his city, he was instrumental in bringing the trouble to an end. As circuit attorney, Mr. Folk acquired national fame by prosecution of those involved in election frauds and by the vigorous way in which he purified the municipal affairs of St. Louis. He served as governor of Missouri for one term, ending in 1909. In this position also he distinguished himself for his fearless enforcement of the laws of the state. He has been a popular lecturer in Chautauqua and lyceum courses.

Folk Lore, the science which includes everything relating to the ancient notions, beliefs, customs, traditions, prejudices and superstitions of the common people; more specifically, it embraces folk tales, hero tales, ballads and songs, place legends, festivals, ceremonies, games, witchcraft, popular sayings, proverbs, jingles, riddles, etc. The systematic study of

folk lore did not begin until the 19th century, though Percy's *Reliques of Ancient English Poetry,* published in 1765, had inspired Scott and others to examine the rich stores of poetic beauty bequeathed by the past. The earliest collection of folk-lore material was made by the Grimm brothers, who created a school in this field of study. Societies have been formed in many countries to carry on the work. The Folk Lore Society of England was established in 1878, and an American society in 1888. The latter includes in its study the lore of the negroes and of the Indians. Folk lore embraces the study of many apparently trivial matters, but it serves to bring out the relationship between races and the origin of religious beliefs and ceremonies, and thus is of assistance to students of ethnology, sociology, history, mythology and religion. See GRIMM, JACOB AND WILHELM.

Fond du Lac, Wis., a city and the county seat of Fond du Lac Co., about 60 m. n. of Milwaukee, at the south end of Lake Winnebago, at the mouth of the Fond du Lac River. The Chicago, Milwaukee & St. Paul, the Chicago & North Western, the Minneapolis, St. Paul & Sault Ste. Marie and other railroads enter the city, and interurban electric and steamboat lines establish connection with surrounding territory and with the principal lake ports. Chief among the manufactures are wagons, carriages, automobiles, agricultural implements, machinery, furniture, refrigerators, toys, flour, sashes, doors, leather goods, paper and shirts. The town has a large output of dairy products, grain and lumber. Noteworthy institutions and buildings of Fond du Lac are Grafton Hall School for girls, a Protestant Episcopal cathedral, St. Agnes's Hospital, the Henry Boyle Roman Catholic Home for the Aged, the Elks' Clubhouse, St. Mary's Springs Sanitarium and a Carnegie public library. The first settlement on the site of Fond du Lac was made by Germans about 1835; the village which arose was incorporated in 1852. Population in 1920, U. S. Census, 23,427.

Fontainebleau, *Fon"ten"blo',* a town of France about 37 m. s.e. of Paris and 2 m. from the Seine, famous for its grapes. It has clean, wide streets and is set in the midst of the Forest of Fontainebleau. It is chiefly noted for its palace, one of the most magnificent in all France. The origin of the palace is unknown, but the older château was used by Louis VII in the 12th century, and the present palace was erected by Francis I. Here the Edict of Nantes was signed, Pope Pius VII lived two years as a prisoner, and Napoleon signed his abdication.

Fontenoy, *Font"nwah',* **Battle of,** a battle of the War of the Austrian Succession, wherein on May 11, 1745, the French under Marshal Saxe defeated the allied English, Dutch and Hanoverian troops under the Duke of Cumberland. The village of Fontenoy lies in Belgium about four miles southeast of Tournai, which was the objective point of both factions. The battle, though long indecisive, was finally a complete French victory.

Food, any substance taken into the body to nourish life. It may be gaseous, liquid or solid, but must be a substance which can be absorbed from the alimentary canal and so contribute to the growth of the body, an oxidizable substance that furnishes energy or a soluble substance that aids in the absorption of other foods. Oxygen is the great gaseous food, and without it all other foods prove useless. It is taken from the air into the blood through the lungs, and is the agent which burns, or oxidizes, the other foods. Water is the most common liquid food, and it acts chiefly as a solvent for the solid foods.

The solid foods are of three general classes, the nitrogenous, carbohydrates and hydrocarbons. Those of the first class consist chiefly of proteids and they are found abundantly in lean meat, eggs, milk, cheese and many vegetables. They are chiefly digested in the stomach and are absorbed from there to form new tissues or to replace old ones that have been torn down. Albuminoids, though

not as valuable as the proteids, are still useful; gelatin and the various jellies which are made with it are the commonest albuminoids. The carbohydrates are the sugars and starches; they contain carbon, hydrogen and oxygen and are found in nearly all fruits and vegetables. They are partly digested by the saliva in the mouth, and the process there begun is completed in the intestines. Since the carbohydrates contain a greater percentage of carbon and of hydrogen than of oxygen, they do not yield so much energy as do the hydrocarbons. The hydrocarbons are the fats and oils and are found in butter and in most animal products. They are also digested in the intestines and, having a large percentage of oxygen, are great heat producers. Mineral substances pass through the body undigested or are taken with other foods and pass into the system unchanged.

The value of a food depends upon its ability to supply warmth, energy and building material. Its money value depends not so much upon the amount as upon its ability to satisfy our needs. According to the United States Department of Agriculture, the following foods have the greatest fuel value: olive oil, lard, beef suet, butter, walnut, coconut, bacon, peanut butter, cream cheese, smoked ham, chestnuts, sugar, corn and buckwheat. The chief protein foods are: oats, corn, wheat, rye, buckwheat, corn bread, whole-wheat bread, toasted bread, white bread, cottage cheese, peanuts, potatoes, smoked herring, skim milk, salt cod, buttermilk, cream cheese, beef steak, pork chops, mackerel, dried beef, smoked ham, lamb chops, rice and eggs. Various bulletins concerning dietary standards and the relative values of foods may be secured from the United States Department of Agriculture, Office of Experiment Stations.

The Illinois State Food Commission, after careful analysis, prepared the following table of relative food values:

EACH OF THESE FOODS CONTAINS THE SAME AMOUNT OF NUTRITIVE MATERIAL AS 1 QUART OF MILK

KIND OF FOOD	COST	NUMBER OR MEASURE	WEIGHT GRAMS	AMOUNT		TOTAL COST
				WEIGHT		
				Lb.	Oz.	
Milk	$0.08 per Qt.	1 Qt.	976	2	2	$0.08
Cheese 1	0.22 " Lb.	.....	193.3	.....	6.8	0.093
Eggs	0.35 " Doz.	10	566	1	3.9	0.29
Meat 2	0.22 " Lb.	.....	307.7	.....	10.8	0.148
Codfish 3	0.15 " Lb.	.....	428.5	.....	15.1	0.141
Bread 5	.....	.....	188.6	.....	6.6	0.025
Corn Meal	0.03 " Lb.	.....	137.7	.....	4.9	0.009
Potatoes 4	1.00 " Bu.	7	722.7	1	9.4	0.026
Cabbage	0.025 " Lb.	1 Head	1875	4	2.2	0.10
Dried Beans	0.06 " Lb.	.....	143	.....	5.05	0.018
Oranges	0.40 " Lb.	8	1304.4	2	14.0	0.226
Apples	0.60 " Pk.	12	1052.6	2	5.1	0.092
Bananas	0.20 " Doz.	5	774	1	11.3	0.10
Prunes	0.15 " Lb.	.....	187.5	.....	6.62	0.061
Nuts	0.60 " Lb.	.....	128.7	.....	4.5	0.163

1. Full Cream Cheese. 2. Meat—Fat, Round Beef. 3. Codfish—Boneless.
4. Potatoes—60 Lb. to Bushel. 5. Bread—White.

Foot and Mouth Disease, a disease common among European cattle and appearing in eruptions upon the skin of the mouth and feet. It is usually accompanied by fever and produces a consequent weakness. Lambs are especially apt to die from the effects of it, but the disease is not ordinarily fatal. Since it

is a bacterial disease, the infection is apt to spread and stables should be frequently disinfected. The meat from cattle having the foot and mouth disease is not infected, but milk and milk products, as cheese and butter, carry the bacteria to man and cause a similar diseased condition. The bacterium which causes foot and mouth disease has not been isolated and inoculation has not proved unfailingly successful. The best treatment is to keep the diseased parts as antiseptic as possible and allow all possible exposure to sunlight and fresh air.

Football, a game played, chiefly as a part of college and high school athletics, during the autumn and early winter.

THE GAME. Football is played in a rectangular field, called the gridiron, 360 ft. long and 160 ft. wide; the limits at the ends of the field are called the *end lines* and those at the sides are called the *side lines*. The *goal lines* lie 30 ft. from the end lines and parallel to them, and the portions of the field between them and the end lines are called the *end zones*. The gridiron is marked at intervals of five yards with white lines, also parallel to the end lines. Two goal posts, 18½ ft. apart, stand at the center of each end line and are connected by a horizontal crossbar 10 ft. above the ground. The ball is a leather-covered, inflated spheroid whose lengthwise circumference is 28 inches and whose short axis circumference is 22½ inches. The time of play consists of 60 minutes, which since 1910 has been divided into four periods of 15 minutes each, exclusive of any time taken out. There is an intermission of one minute between the first and second and between the third and fourth periods, and of 15 minutes between the second and third periods.

The game is played by two opposing teams of 11 players each, and the object of the play is for each team to put the ball behind its opponent's goal posts, while at the same time it attempts to prevent the opposing team from making a score. A touchdown is made when a ball in the possession of any player is on, above or behind the opponent's goal line; this counts six points. A goal from touchdown is made by kicking the ball from the field over the crossbar of the opponent's goal by a place kick; a goal from touchdown counts one point A goal from field, counting three points, is made by kicking the ball from the field over the crossbar of the opponent's goal in any way except by a *punt,* that is, dropping the ball from the hands and kicking it before it touches the ground; or by a *kick-off,* that is, the opening kick of the first and third periods, and consists of a place kick from the 40-yard line of the team entitled to kick. Safety, counting two points, is made when the ball in possession of a player guarding his own goal is on, above or behind the goal line, provided the impetus was given by the side defending the goal. The ball is first placed in the center of the field, and the men line up in the following positions, with the two teams facing each other: center, right and left guards, and right and left tackles; behind these a quarter back, two half backs and a full back. The official rules change from year to year and cannot here be given in detail. Consult *Spalding's Official Foot Ball Guide.*

HISTORY. Football has been known in a variety of forms since medieval times. In the city of Florence the Medicis were among enthusiastic players of the game. Though much decried, it was long a favorite sport in Great Britain, where it became a college game at Eton, Rugby, Harrow and Charterhouse. The game was first introduced into America at Harvard in 1875 and the Rugby rules were used; the first intercollegiate contest was between Harvard and Yale a year later and from that time on American colleges took up the sport with enthusiasm. With the formation of an intercollegiate football association in 1885, American rules, which have differed greatly from those used in England, have developed. Football has never been played to any extent outside of schools and colleges, but there

large crowds are attracted to the games, which are followed with great interest. The old methods of playing resulted in so many injuries to the players that the later revisions of the rules aim to eliminate the personal struggles of the players and the team plays that require a massing of the teams. Owing to the objections that have been made to the roughness of the play the game is not so popular as formerly.

Foote, *Foot,* **Andrew Hull** (1806-1863), an American naval officer, born in New Haven, Conn. He studied at West Point, but entered the navy as midshipman in 1822. He was flag lieutenant of the Mediterranean Squadron in 1833, five years later as first lieutenant of the *John Adams,* circumnavigated the globe and attacked the pirates of Sumatra, from 1849 to 1852 engaged in suppressing the slave trade on the African coast, and in 1856, during the Chinese and English disturbance, commanded the China station. In the summer of 1861 he was made captain and commanded the fleet in the Southwest. In February of the following year he cooperated with Grant against forts Henry and Donelson, being severely wounded in the attack on the latter stronghold. Though suffering, he commanded the naval attack on Island No. 10, but after the reduction of that place was forced to return home, in July, 1862, with the rank of rear-admiral. He then acted as chief of the bureau of equipment and recruiting and in June, 1863, was ordered to succeed Rear-Admiral DuPont in command of the South Atlantic Squadron. Foote died, however, while preparing to assume duties off Charleston.

Foote, Mary Hallock (1847-), an American author and artist, born in Milton, N. Y. She studied art in New York and has illustrated in black and white for magazines and books. She married a civil engineer and subsequently lived in Colorado, Idaho, and California, whence are drawn the scenes of many of her works. These include *The Led-Horse Claim, John Bodewin's Testimony, The Last Assembly Ball, The Chosen Valley, In Exile and Other Stories, Cœur d'Alène, The Little Fig Tree Stories, The Prodigal, The Desert and the Sown, A Touch of Sun, and Other Stories* and *The Royal Americans.*

Foot Pound, abbreviated ft. lb., the common unit of work in most English-speaking countries. It is the work required to raise a one-pound weight one foot against the attraction of gravity, and is equal to 32.16 foot poundals where the acceleration of gravity is 32.16 ft. per second per second. See Foot Poundal.

Foot Poundal, the unit of work in the foot-pound-second system of units. It is the work done by a force of one poundal when it moves its point of application one foot in the direction the force acts. The work required to raise a pound weight one foot is 32.16 foot poundals, since the earth pulls down on a pound of matter with a force of 32.16 poundals. See Poundal.

Foot Rot, a disease attacking the feet of sheep and causing unusual growth. The margins become cracked and thus open to the entrance of dirt which induces soreness and ulceration. The secretions from the glands between the toes cease to flow and a growth of proud flesh results. The disease is said to be caused by allowing the animals to stand too much upon damp ground. To treat, the diseased portion should be cut away, the wound washed with a solution of one pound of blue vitriol to one quart of water, and the animal kept in a thoroughly dry shed.

For'aker, Joseph Benson (1846-1917), an American statesman born in Rainsboro, Ohio. When 16 years of age he enlisted in the Union army and served throughout the war. He graduated from Cornell in 1869; was admitted to the bar in the same year; was judge of the Cincinnati Superior Court, 1879-82; was governor of Ohio 1885-90; and was United States senator from 1897 to 1909. He was identified in Congress with the conservative wing of the Republican Party, and exercised great influence in its councils.

Foram"inif'era, a group of minute microscopic water animals, a subdivision of the Protozoa. The body of the animal is contained within a shell formed from sand, mud, sponge spicules or other foreign matter cemented together in symmetrical and varied form. Fossil remains of these shells are found all over the ocean floor, excepting the Arctic regions, in deposits which are often of great thickness. Whole beds of chalk and limestone in Europe, Asia and North America are formed from the shells of the foraminifera, the oldest-known formation occurring in the Lower Cambrian rocks of New Brunswick, Canada. The type of the order has undergone few changes from the earliest times to the present.

Forbes, *Forbz,* **Archibald** (1838-1900), an English war correspondent, born in Scotland and educated at Aberdeen University. After serving in the Royal Dragoons he went to London in 1865 and began work on a newspaper. He served as a war correspondent for the London *Daily News* throughout the Franco-German War, and also during the Russo-Turkish War of 1877 and the Zulu War of 1879. He was unrivaled at securing news and quick reporting, riding 120 miles in 15 hours to report the victory of Ulundi in 1879. Among his stirring war stories may be mentioned *Glimpses Through the Cannon Smoke, My Experiences in the Franco-German War, The Afghan Wars, The Black Watch* and *Barracks, Bivouacs, and Battles.*

Force, that which tends to produce, alter or destroy motion of a body. Forces may be due to various causes, as gravity, elasticity, friction, magnetism, electricity, etc. Force does not always produce motion, although it tends to do so, for an equal and opposite force may be exerted as soon as the first force acts. Thus, in attempting to draw a nail from a plank, the force of friction is immediately exerted in such a direction as to oppose the force applied to draw the nail. The effect of a force in producing motion of a free body depends on both the magnitude of the force and the length of time it acts. A constant force, such as the force of gravity, produces uniformly accelerated motion in a free body; if the force is variable, the resulting motion is accelerated but not uniformly.

When a force acts for a very short time, as the blow of a hammer on a nail or a bat striking a baseball, it is not usually possible to measure separately either the force or the length of time it acts. Such a force is called an impulsive force, and since its effect is determined by its (unknown) magnitude and the (unknown) time it acts, the product of its magnitude by the length of time it acts is called the impulse of the force. This product, or impulse of the force, can usually be determined from the change of momentum produced in the body struck or from the loss of momentum in the body giving the blow, since change of momentum of a body is equal to the impulse causing it (See MOTION, LAWS OF). In the case of the hammer blow, the impulse is measured by the mass of the hammer multiplied by its speed at the instant of striking the nail, since the hammer loses its entire momentum when stopped by the nail.

A centrifugal force is that force by which a revolving body tends to pull away from the center about which it is revolving. The opposite force, which resists this tendency, is sometimes called a centripetal force. When a pail of water is rapidly swung in a vertical circle, the water is kept from spilling by the centrifugal force which drives it outward against the bottom of the pail, while the pail is kept in its circular path by the centripetal force exerted through the arm that swings it.

There are several units in common use for measuring forces: (1) the pound, the force necessary to support a one-pound weight; (2) the kilogram, the force necessary to support a one-kilogram weight; (3) the poundal (See POUNDAL); and (4) the dyne (See DYNE). Of these, the first two are gravitational units, and their values vary slightly from place to place on the earth's

surface due to the variation in the force of gravity. The first is the one in most common use in engineering work in this country. The last two are absolute units independent of any locality where they may be used; the fourth being the one most commonly employed in accurate scientific work in nearly all countries.

Force Bills, the name applied to several Federal laws whose object has been to provide means for enforcing certain statutes offensive to the section where they operated. The first of these laws, March, 1833, aimed to compel the acceptance of certain tariff laws. During the Reconstruction Period, after the passage of amendments Fourteen and Fifteen, Congress passed a second so-called Force Bill on May 31, 1870. It made punishable by fine or imprisonment any attempt to intimidate qualified voters from expressing themselves at the polls. Another act of this nature was directed against certain societies organized systematically to evade Federal laws in the South.

Ford, Paul Leicester (1865-1902), an American historian and novelist, born in Brooklyn, N. Y. He received his education in private schools, chiefly in his native town. His investigations into the source of American history led to the editing of the *Writings of Thomas Jefferson, Writings of Thomas Dickinson* and *The Federalist.* He wrote *The True George Washington, The Many-Sided Franklin* and *The New England Primer.* He founded the *Bibliographer,* and as its editor made valuable contributions to it. His fiction includes *The Honorable Peter Stirling, The Great K. & A. Train Robbery, Tattle Tales of Cupid, Janice Meredith, Wanted: a Matchmaker* and *Wanted: a Chaperon.*

Foresters, Ancient Order of, a fraternal society founded in Yorkshire, England, in 1745. It was introduced into the United States in 1836 and now has about 45,000 members in the country. The entire membership throughout the world is over 1,293,000.

Foresters, Independent Order of, a fraternal organization founded in Newark, N. J., in 1874 and reorganized in 1881. There are branches in Canada, Great Britain and other European countries and in India and Australia. The membership is some over 242,000.

Foresters of America, a fraternal organization founded in 1864 and reorganized in 1889. It has no connection with the Ancient Order of Foresters or the Independent Order of Foresters, and its jurisdiction is confined to the United States. The membership is about 240,000.

Forestry, the science of producing, caring for and cultivating large groves and forests. It differs from the study of a single tree, or dendrology, in that it takes up the forest as a whole; and treats of the relations of the trees to each other and of their separate needs, rather than being a study of botanical structure or classification. The study of forestry, while scientific, is also wholly practical and has recently come into prominence in the United States through the awakening to the fact that the forests were not unlimited in extent. In the majority of countries where there have been forests of great extent, there have been four steps in changing public opinion in regard to forests. The first attitude toward the forests was to consider them so abundant as to be more of a nuisance than a resource. They were hewed down recklessly to prepare the way for agriculture and were neglected where they were not destroyed. As the settlements grew and the wood supply retreated farther and farther from them, the forests were seized as valuable possessions, sources of wealth to individuals who owned them and who thus destroyed them for personal profit or to some extent spared and protected them. The third step came through the knowledge that the wood supply was waning and, though still plentiful, was not, as had been supposed, unlimited; the forests began to be treated as agricultural crops which, when destroyed, must be renewed, and the management of forests to secure the best growth became important. The last step and the one which is slowly being approached in the United States is

that forests as a natural and national resource must be protected and controlled, not by individual whim and for the benefit of the present generation, but by scientific knowledge and in order that they may yield a constant, maximum product from one generation to the next. To one who passes through the vast forests of the Northwest there seems to be still no limit to the lumber, but the same amount of time spent viewing the products of furniture factories, box factories and lumber yards suddenly changes the point of view and makes one wonder where the necessary lumber could be produced.

It is almost impossible to estimate just how much faster the wood is being cut down than it is being produced, nor how long at the present rate of destruction the supply will last. The forest area of the United States is estimated at about 937,500 sq. m., or a little more than one-fourth the area of the country, and the annual growth at 60 board feet per acre. This gives a yearly increase of 36,000,000,000 board feet, while the amount used for lumber alone is equal to, if not more than, this amount. The other uses, for shingles, ties, pulp wood, cooperage stock, mine timbering, veneer, lath, poles and wood for distillation, are also taken from the unrenewed forests.

A growing appreciation of this and a study of conditions in foreign countries has led to the establishment in the United States of a Bureau of Forest Service in the Federal Department of Agriculture; its head is the national forester, whose headquarters are at Washington. The duties of the forest service are the patrol of the national forests to check fires and protect the trees from floods, disease, decay, and from depredations of man, and the planting of new trees to replace old ones. Most interesting in the latter connection is the planting in the Tahoe National Park, California, of sequoia saplings, which will not reach maturity for at least 2000 years. Unfortunately the appropriation set aside by Congress for the protection of the national forests is strikingly inadequate to the work necessary to be done. Telephone service must be maintained, fire protection provided, experts employed and scientific study carried on in order to make the service wholly effective. The department itself has, however, accomplished a great work and is providing for coming generations a heritage that would otherwise be uselessly lost.

The number of acres of forest land under control of the United States Government in 1912 is here given:

Arizona	13,883,452
Arkansas	1,184,012
California	21,104,069
Colorado	13,408,138
Florida	318,960
Idaho	18,139,435
Kansas	156,376
Michigan	84,011
Minnesota	844,473
Montana	16,192,504
Nebraska	521,065
Nevada	5,424,254
New Mexico	9,810,522
North Dakota	6,224
Oklahoma	61,028
Oregon	13,740,139
South Dakota	1,073,760
Utah	7,201,695
Washington	9,914,314
Wyoming	8,420,497
Alaska	26,643,260
Porto Rico	32,975

The timber in the National Forests of Alaska is estimated at 69,000,000,000 ft. In 1911 Congress made an appropriation of $2,000,000 for the purchase of forest areas in the Appalachian and White mountain regions. The forestry service is engaged in reforesting 7,500,000 acres that have been denuded by fires, and in connection with this work over 30 nursery stations are maintained.

Many of the leading universities and the majority of the agricultural colleges have established schools for forestry to train men for governmental and commercial work. Men taking up this profession study the trees to find at what age they may be cut to yield the most and the best quality of lumber, to discover methods of avoiding destructive

lumbering and to check the advance of fungus disease and insect pests. The field offers an opportunity for scientific study among the most pleasing surroundings to one who enjoys outdoor life and its accompanying freedom.

The study of forestry in foreign countries is among the oldest of sciences. It is practiced in every civilized country and has been discussed for over 2000 years in many of them. Germany, which has 35,000,000 acres of forests, leads in scientific knowledge and in practical success of its application. At present the system practiced there has solved the problem of securing an increasing forest output and at the same time increasing profits with no danger of final destruction of the forests. Compare with that the fact that the United States, which might be growing all the lumber that it needs, is now using three times as much as it produces. In France and in the most of the other European countries reforestation has been practiced for at least 50 years, and many countries require a man who cuts his forest to replant as many trees as he has cut. The fact that when forests have once been destroyed there is no way of hurrying the growth of a new crop makes foresight more necessary than in the case of shorter-lived crops. The effect of the lack of lumber upon numerous industries and its connections with climatic and soil conditions and irrigation make the study of forestry one which is of general interest and not one affecting only a few individuals or this generation alone. See CONSERVATION.

Forge, Forging. A forge is an open furnace or hearth provided with an air blast and used for heating materials, that they may be shaped into forms by hammering and pressing. Forges are made in all sizes, from the diminutive gas-heating device used by jewelers to the great furnaces for heating armor plates and steel ingots weighing many tons. Portable forges are usually constructed of metal and comprise a shallow pan for the hearth, over which is a smoke hood and to which a fan blower, with its driving mechanism, is attached, all mounted on four legs made of metal tubes. Stationary forges are built of masonry, lined with fire brick and supported by heavy steel plates and rods drawn together on the outside. The blast is produced by power fans.

Forging originally was simply a hammering process, but since the development of steel making, the power press has largely superseded the hammer. The hydraulic press squeezes the material into shape by a slow, steady pressure, while that used for drop forgings strikes a sudden, heavy blow, forcing the heated metal into a die, or other form. Many articles that were formerly made of cast iron are now made of steel by drop forging and by pressure of steel into dies. For large forgings of simple form the steam hammer is still employed to advantage. See IRON AND STEEL; HYDROSTATIC PRESS; STEAM HAMMER.

FORGET-ME-NOT

Forget-me-not, a plant of the Borage Family whose flowers are as much loved and widely sung as those of any plant. The leaves and stems are light green or even grayish and so form an inconspicuous and fitting background to the starry blue flowers with their golden centers. The artistic simplicity of their form and their clear blue color render them a favorite in pictures. Though delicate in appearance, the for-

get-me-not is a hardy plant and blossoms profusely; it is the emblem of constancy. The wild species found in the United States is no doubt an escape from old gardens which always included this dainty, lovable flower. A less commonly known though widely growing species has white flowers, similar in form but lacking the chief charm of the true forget-me-not, the clear, bright blue color. The forget-me-not is the flower of Alaska.

For'malin, a powerful antiseptic and disinfectant made by the solution of 40 per cent of formaldehyde gas in water. It is used in surgery and has lately been injected with success as an antitoxin in cases of blood poisoning.

For'mic Acid, a colorless acid found in various plants and animals; notably in pine needles, nettles, the soap tree, tamarind, bees, red ants, caterpillars and in the human body. It is an irritating acid, in concentrated form causing severe skin burns. Its chief chemical property is its ability to take up oxygen. Formic acid may be prepared by the distillation of red ants. Formaldehyde, the well-known antiseptic, takes its name from the fact that by oxidization it is converted into formic acid.

Formo'sa. See JAPAN.

Forrest, Edwin (1806-1872), an American actor, born in Philadelphia, Pa. In 1820 he made his first appearance in Home's *Douglas,* and was particularly successful in *Othello,* which he played in New York six years later. His popularity in London, where he went in 1836, continued until he yielded to his jealousy and hissed Macready, the favorite actor of the English stage. When Macready played in New York City the Astor Place Riot occurred and Forrest was severely criticized for this affair, although he was far from solely to blame. The fortune which he made in his profession amounted to $1,000,000, and on his death he bequeathed a large portion of his estate to found a home for aged and poor actors. He was an eminent tragedian, excelling in melodramatic parts and in Shakesperean rôles.

Forrest, Nathan Bedford (1821-1877), an American soldier, born in Tennessee. Early in the Civil War he raised and equipped a Confederate regiment of cavalry and commanded at Ft. Donelson. He was wounded at Shiloh, captured Murfreesboro and was shortly commissioned brigadier-general. In 1864 he captured Ft. Pillow (See FORT PILLOW). He was acknowledged the foremost Confederate leader of the West, and his invasion of Tennessee, in 1864, was among the most spectacular raids of the war.

Fort Collins, Colo., a city and county seat of Larimer Co., 74 m. n. of Denver, on Cache la Poudre River and on the Colorado & Southern Railroad. The city is situated in a fertile valley watered by an extensive irrigation system, near the Snowy Range of the Rocky Mountains. Long's Peak, 14,231 ft. high, is in Larimer County. Fort Collins is the seat of the state agricultural college, opened in 1879, and of a government experiment station. There is good water power for manufacturing purposes. Population in 1920, 8,755.

Fort Dearborn, a stronghold built in 1804-05 on the site of the present city of Chicago (See CHICAGO, subhead *History*). It is well known from the massacre which occurred there on Aug. 15, 1812. By orders of Gen. William Hull, the garrison of 67 men, under Capt. Nathan Heald, with some 30 resident settlers, evacuated the fort, and while retreating to Detroit were attacked in ambush by 500 Indians and by the band of Miami which was acting as their escort to safety. Fully two-thirds of the number, including 12 children, were killed. The survivors surrendered on promise of protection, and from Ft. Mackinaw were eventually returned to their homes. On the day following the massacre the Indians burned Ft. Dearborn, which was rebuilt in 1816 only to be destroyed in 1856. *When Wilderness was King,* the novel by Randall Parrish, gives the story of the outrage, but without historical accuracy.

Fort Dodge, Iowa, a city and the county seat of Webster Co., 89 m. n.w.

of Des Moines, on the Des Moines River and on the Chicago, Rock Island & Pacific, the Illinois Central, the Minneapolis & St. Louis, the Chicago, Great Western and other railroads. The Ft. Dodge, Des Moines & Southern, an interurban electric railway, also enters the city. Fort Dodge is an important railway and shipping center and is situated in a section rich in natural resources, for which it is the principal market. In the vicinity are extensive deposits of potter's clay, glass sand, limestone and a gypsum bed 50 sq. m. in extent, said to be the most valuable in the United States. Coal also abounds and coal mining is one of the chief industries. Among the manufactures are pottery, sewer pipe, brick, tile, plaster, stucco, paints, shoes, foundry and machine-shop products and oatmeal.

Among the interesting features of the city are Wild Cat Cave, Eureka Springs, Reynolds Park and Oleson Park. A steel railway bridge, one of the longest in the country, spans the river at this point. There are several important educational institutions in the town. These include Tobin College, a flourishing school, St. Paul's School (Evangelican Lutheran), two Roman Catholic schools, Corpus Christi Academy and the Sacred Heart School, Our Lady of Lourdes Convent, a commercial and business school and a public library. The first settlers on the site of Fort Dodge were protected by Ft. Clark, built in 1850. The name was changed in 1851 in honor of Col. Henry Dodge, a prominent soldier and public man. In 1854 the town was laid out and in 1869 chartered as a city. Population in 1920, U. S. Census, 19,347.

Fort Don'elson. See FORT HENRY AND FORT DONELSON.

Fort Duquesne, *Du kane'*, a fort established in 1754 at the confluence of the Monongahela and Allegheny rivers, the site of the present city of Pittsburgh. The fort was begun by Virginia settlers, but the situation was desired by the French, who early in the year succeeded in taking it. The next year the British under General Braddock were disastrously defeated in an attempt to capture the fort. In 1758, however, they were successful, and immediately changed the name to Ft. Pitt in honor of William Pitt. See PITTSBURGH, subhead *History*.

Fort Edward, a fort in New York, about 20 m. from the head of Lake Champlain. About 1700 its site was known to the French and English as the Great Carrying Place, as it was the custom of Indian war parties to make a portage from it on their way to Canada. In 1709 Colonel Nicholson built a stockade there which was called Ft. Nicholson. In 1755 another stronghold was erected on the site and named Ft. Edward, in honor of the Duke of York. It was a haven for survivors of the Ft. William Henry Massacre, 1757, and was a starting place for expeditions into Canada during the French and Indian and Revolutionary wars. During the Saratoga campaign it was occupied for a time by Schuyler and by Burgoyne. See FORT WILLIAM HENRY; SARATOGA, BATTLES OF.

Fort Erie, Attack on. During the War of 1812, a night attack was made on the Americans, under General Brown, at Ft. Erie, at the head of the Niagara, by the British under General Drummond, Aug. 15, 1814. The attack was a blunder and, though fighting bravely, the British were repulsed with a loss of some 900 men. The Americans lost 84.

Fort Fisher, a fort in North Carolina, protecting Wilmington. On Dec. 24 and 25, 1864, it was attacked by Porter's fleet of 500 guns and 6500 troops under Butler and Weitzel. This attack failing, Grant sent General Terry with a large force to aid Porter, and after a desperate assault the fort, garrisoned by Whiting with 2300 Confederates, surrendered Jan. 15, 1865. The mouth of the Cape Fear River was closed, and the blockade of Southern ports was made complete.

Fort Griswold, Massacre of, an event of the Revolutionary War, occurring Sept. 6, 1781, at Groton, Conn. After prolonged resistance, some 800 Tories under Benedict Arnold gained the fort, which was garrisoned by 150 Americans. In the butchery that followed the surren-

der, 85 of the 150 were killed and 35 were mortally wounded. A monument has been erected on the site of the fort.

Forth, a river and estuary of southern Scotland formed by the juncture of Duchray Water and the Avondhu. The river has a winding course, giving it a length of 66 m., whereas the distance in a direct line is less than half as much. It has a general southeasterly direction through passes of great beauty, and the interesting and historic towns of Stirling, Kirkcaldy and Leith lie upon its banks. Many bridges, ferries and railway viaducts cross the stream, chief among which is the famous Queensferry cantilever bridge, completed in 1899 at a cost of $13,000,000. The tide ascends the river to nearly five miles above Stirling, and the stream may be navigated to that point by ocean-going vessels.

Fort Henry and Fort Donelson, two forts in Tennessee, near the Kentucky border. The first was a small position on the right bank of the Tennessee River, but the second, 12 m. away, was much more formidable, being situated on a plateau about 100 ft. above the Cumberland River. It extended over 100 acres and, besides its heavy guns, had two batteries on the river bank beneath the bluff. These posts were erected by the Confederates in 1861 and commanded the entrance to the Central and Southern states.

On Feb. 6, 1862, General Grant and Commodore Foote captured Ft. Henry, most of the garrison of which had escaped to Ft. Donelson. About a week later Grant attacked Ft. Donelson and, after three days of vigorous bombarding, in which he was supported by the fleet, received a note from General Buckner offering to capitulate. To this Grant promptly answered, "No terms except unconditional and immediate surrender can be accepted. I propose to move immediately upon your works." Buckner was forced by circumstances to accept these terms, and, Feb. 16, surrendered about 15,000 men with a great quantity of stores and ammunition. The Federals lost over 2800 men. This was the first real Northern victory of the war, and it opened the way to the heart of the Southwest.

For"tifica'tion, the art of protecting, by engineering devices, troops or places from attacks by the enemy. The term is also applied to the works constructed for this purpose. The earliest fortifications were natural objects, such as trees, rocks and mounds of earth, behind which men could shield themselves from the missiles of the enemy. As armies were organized, artificial works were often constructed, their nature depending upon the material at hand and the sort of weapons in use. A hedge of fallen timber and brush, for instance, afforded good protection against arrows and javelins, and at the same time an obstruction over which the attacking party could not readily pass. The palisade of stakes was often employed by the American colonists in Indian warfare, and, unless set on fire by the enemy, was very effective. As the Indians gained possession of firearms, the blockhouse succeeded the palisade. This was a square structure built of hewn timbers eight to ten inches in thickness and laid one upon the other. The base was a little smaller than the house, in whose walls were numerous openings through which the garrison could fire.

Field fortifications usually consist of an embankment of earth a few feet high often hastily constructed. When the material is at hand and time permits, the front of such works may consist of logs. The earth is then banked against the logs, forming a firm and efficient protection against infantry fire, but of little use if artillery is used against them.

The great fortifications constructed for the protection of harbors and on strategic points along the coast are works requiring the greatest engineering skill. They are intended to be strong enough to resist the fire from the largest battleships. Experiments have proven that banks of sand form the most effective resistance to heavy ordnance; therefore the most approved fortifications consist of strong walls of masonry, often 30 ft.

or more in thickness, surrounded with banks of sand and earth of such thickness, that a shot in penetrating them will lose its force before reaching the wall. The mound is usually covered with grass, so as to make it as inconspicuous as possible. The large cannon within the fort are mounted upon carriages, which will allow them to be elevated into a position for firing and then to be lowered to their former position of safety. Such an arrangement is called a disappearing carriage.

The largest guns within these forts are 40 ft. long and weigh over 100,000 lb. They require a charge of 500 lb. of powder and will throw a 12-inch ball 9 m. The United States has numerous fortifications of the most modern type extending along the Atlantic coast from Portsmouth, N. H., to Key West. In addition to these, there are six on the Gulf of Mexico and eight on the Pacific coast.

Fort Madison, Iowa, a city and the county seat of Lee Co., about 20 m. s.w. of Burlington, on the Mississippi River and on the Chicago, Burlington & Quincy, the Atchison, Topeka & Santa Fe and other railroads. A railway and highway bridge crosses the river at this point. The city has a variety of industrial interests and operates foundries, machine shops, sawmills, grain elevators, canning factories, heater works, a pork-packing plant and manufactories of brick, chairs, wrapping paper, agricultural implements, boots and shoes, overgaiters, buttons and flour. Among the principal features of Fort Madison are the state penitentiary and the Cattermole Memorial Library. The first permanent settlement was established here in 1833 on the site of an earlier stockade. The town was laid out in 1836 and chartered as a city in 1839. Population in 1920, 12,066.

Fort Mer'cer, an abandoned fort in New Jersey, at Red Bank on the Delaware. During the Revolution it was a defense of Philadelphia, and after his occupation of that city, 1777, Howe determined to capture it with Ft. Mifflin, and thus prevent a seige by controlling the water route to New York. A picked detachment of 2500, most of whom were Hessians, marched against Ft. Mercer, while a supporting fleet came up the river. On Oct. 22 the attack was made, the American garrison of 300 under Col. Christopher Greene fighting bravely till the Hessians were forced to withdraw. The stronghold was abandoned Nov. 20, after the capture of Ft. Mifflin, and was destroyed by the British.

Fort Mims, Massacre of, a massacre perpetrated during the Creek War at Ft. Mims, a temporary stockade 35 m. above Mobile, on the Alabama River. At the outbreak of the war some 550 men, women and children had gathered here for protection. These, including the garrison of about 200, under the command of the half-breeds Bailey and Beasley, were surprised on Aug. 30, 1813, by 800 Indians, under the leadership of the half-breeds Weathersford and McQueen. Fifteen escaped, a few negroes and half-breeds were made prisoners and the remainder were scalped.

Fort Moultrie, *Mol' try,* a fort on Sullivan's Island, commanding the harbor of Charleston, S. C. In June, 1776, Sir Peter Parker and a squadron from Ireland, with Sir Henry Clinton and a force of English regulars, attempted to capture Charleston, which was to serve as a base of operations against the colonies in the South. A force of some 5000 militia under Gen. Charles Lee had assembled to defend the city, while 1200 men under Colonel Moultrie were stationed in the unfinished palmetto stronghold, then known as Ft. Sullivan. On June 28 Clinton landed some 3000 men on the sand bank near Sullivan's Island, planning to ford the intervening space of sea and make a land attack at the point of the bayonet. Unfortunately, however, Clinton remained on the sand bank. Parker, in the meantime, had opened fire on the fort and the attack became a mere artillery duel. After ten hours Parker was obliged to retreat out of range. The American loss in killed and wounded was 37; the British, 205. Only one gun had been silenced in the fort, while nine of the ten English sail were unseawor-

thy after the engagement. In commemoration of this repulse the stronghold was subsequently named Ft. Moultrie.

The victory freed the Southern States from invasion for more than two years. May 7, 1780, a few days before the capture of Charleston, the fort surrendered. Previous to the opening of the Civil War, a United States garrison occupied Ft. Moultrie; but on Dec. 26, 1860, Major Anderson transferred the soldiers to Ft. Sumter, which was better protected on the land side. South Carolina militia soon occupied the abandoned fort, which was a defense of Charleston throughout the remainder of the war.

Fort Necessity, Attack on, an incident of the French and Indian War, occurring on July 3, 1754. From Great Meadows, southwestern Pennsylvania, Washington had approached Ft. Duquesne, but, hearing that the French were advancing, he had fallen back to his original position, where he put up a rude breastwork which he named Ft. Necessity and which was garrisoned by some 300 men. On July 3 nearly 500 French and Indians marched upon the fort in a pouring rain, and after nine hours of intermittent fighting the Americans capitulated, giving up all prisoners taken at Great Meadows, but being promised a safe retreat.

Fort Niag'ara, a stronghold on the American side of Niagara River, near its mouth, upon the site of a house built by La Salle about 1669 and of a trading post erected some ten years later. In 1725 Vandreuil built Ft. Niagara, which was destined soon to become the foremost military and trading center in America. During the French and Indian War a British expedition under Governor Shirley of Massachusetts attacked it, and later, in the summer of 1759, it was besieged for 16 days by the British under Prideaux, reinforced by Johnson. It surrendered on July 24. Various Indian treaties were negotiated here; the place served as the headquarters of John Butler and Joseph Brant, and the scene of the organization of the Wyoming and Cherry Valley expeditions. The Americans occupied it upon its evacuation by the British, August, 1796. During the War of 1812, Nov. 21, 1812, it was severely bombarded from the Canadian side, and later, Dec. 19, 1813, it was again attacked and captured, being surrendered to the Americans, however, at the termination of the war. The United States garrison was withdrawn in May, 1826.

Fort Pillow, a fort in Tennessee, about 40 m. n. of Memphis, on the east shore of the Mississippi, built early in 1862 by the Confederates under General Pillow. That summer it was attacked by a fleet of Federal gunboats, the Confederate flotilla being speedily destroyed and the fort itself thereupon reduced, June 4. On Apr. 12, 1864, then held by Major Booth with 550 Federals, 260 of whom were negroes, the place was attacked by a strong force under the Confederate cavalryman, Forrest. After two assaults in which most of the garrison were slain, the fort capitulated.

Fortress Monroe, a military post of the United States located at Old Point Comfort, Va., guarding the entrance to Hampton Roads. The reservation includes 282 acres and has within it a post-graduate artillery school, with equipment for 100 officers and 900 men. Jefferson Davis was imprisoned in Fortress Monroe for two years after the Civil War.

Fort Schuyler, *Ski' ler.* See FORT STANWIX.

Fort Scott, Kan., a city and the county seat of Bourbon Co., 100 m. s. of Kansas City, on the Marmaton River and on the Missouri Pacific, the St. Louis & San Francisco, the Missouri, Kansas & Texas and other railroads. The city occupies a site upon a rolling plain in the midst of rich mineral deposits, especially bituminous coal, and in this article a considerable trade is carried on. Other valuable natural resources are oil, gas, building stone, clays, cement rock, lead and zinc. Excellent sulphur water has been obtained by well-boring. Contributory to the industrial importance of the city are grain elevators, foundries, machine shops, cement and pottery works,

flour mills, brick and tile works and manufactories of sirup and mattresses. The city is the seat of the Kansas Normal College and Notre Dame de Lourdes Academy for girls. Other features worthy of mention are the Mercy Hospital and a public library. There is a national cemetery in the vicinity. Fort Scott, which occupies the site of the fort of the same name, which was abandoned in 1855, was platted in 1857 and three years afterwards chartered as a city. Population in 1920, U. S. Census, 12,066.

Fort Smith, Ark., a city and one of the county seats of Sebastian Co., on the western border of the state and on the Arkansas River at the junction of the Poteau. Transportation facilities are provided by the river and by the Arkansas Central, the Ft. Smith & Western, the St. Louis, Iron Mountain & Southern, the St. Louis & San Francisco, the Kansas City Southern, the Midland Valley and other railroads. Fort Smith is situated in the coal and natural-gas region of the state and is a business center of the surrounding farming country. It has extensive jobbing and wholesale interests in cotton and lumber products, dry goods, meats, groceries and drugs, and carries on a large trade in cotton, lumber, coal, hides and live stock. In the city are a number of plants connected with the cotton industry, saw and planing mills, wagon factories, brickyards and mattress and broom factories. Several furniture factories are also located here and the city is called the "Grand Rapids of Arkansas."

Fort Smith has good public schools and contains a Catholic Academy, convent and infirmary. There is a Carnegie library. The first settlement was made here in 1817, with the establishment of a United States army post. Four years later a town was laid out, which was incorporated in 1842; the place was chartered as a city in 1845. Several skirmishes of the Civil War took place here in 1864. The first railway was completed in 1871. In 1905 the area of the city was more than doubled. Population in 1920, U. S. Census, 28,870.

Fort Stanwix, a stronghold built in 1758 on the site of the present city of Rome, N. Y., by a British soldier named Stanwix. Being situated on the watershed between Lake Ontario and the Hudson, it commanded the main traffic route between New York and Upper Canada, and several Indian treaties were arranged there. In 1769 it was dismantled, but when the Revolution broke out it was again fortified and called Ft. Schuyler. About ten miles from it, Aug. 6, 1777, Herkimer fought the celebrated Battle of Oriskany. See ORISKANY, BATTLE OF.

Fort Sum'ter, a fort guarding Charleston Harbor, S. C., named for Thomas Sumter, a partisan leader of Revolutionary fame. When South Carolina seceded, December, 1860, Major Robert Anderson in command of a small garrison moved from Ft. Moultrie to Ft. Sumter, which was close by and stronger, on Dec. 26. A few days later, on Jan. 9, as the *Star of the West* entered the harbor bringing supplies to the fort, it was fired upon and driven away. This was the opening shot of the Civil War, which was begun in earnest when negotiations between Anderson, the South Carolina authorities and Washington finally resulted in General Beauregard's being ordered to demand the fort and, in case of refusal, to reduce it. Before daylight, Apr. 12, 1861, Ft. Sumter was fired upon. After 34 hours of bombardment, it fell to the Confederacy. In April, 1863, it withstood an attack by nine ironclads, and four months later resisted a heavy bombardment, defending itself until Charleston was evacuated, Feb. 17, 1865. Two months following, on the fourth anniversary of the fall of Ft. Sumter, Anderson (then General) raised over it the identical flag that he had lowered four years before. The fort has been rebuilt and modified. See ANDERSON, ROBERT.

Fortu'na (in Greek Tyche), Roman goddess of good fortune, who was often represented as holding a cornucopia. In her Theban temple she held Wealth in her arms. The worship of Fortuna was prominent among Italian observances.

Fortuny Y Carbo, *For too' ne e Kar'bo,* **Mariano** (1839-1874), a celebrated Spanish painter. He studied in Barcelona and at Rome. Although not a profound master, his skill and facility as a craftsman were exceptional, and in the numerous Eastern scenes which he depicted, color is used with brilliant effect. He produced, among other canvases, *Choosing a Model, The Snake Charmers* and *Moors Playing with a Vulture.*

Fort Washington, an important stronghold of the Revolution, located on the highest part of Manhattan Island, N. Y. It fell to the English under William

FORTUNA

Howe on Nov. 16, 1776. Following the engagement at White Plains, Washington crossed into New Jersey, leaving Ft. Washington in charge of Colonel Magaw. Nov. 15 Howe appeared before the fort with a powerful force, declaring that if it were not immediately surrendered the entire garrison would be put to the sword. On Magaw's determining to defend the position, the British opened an attack in four divisions. On a second summons, being outnumbered more than five to one, Magaw surrendered about 3000 prisoners of war. The loss of Ft. Washington caused widespread consternation and has been regarded as one of the most crushing blows that befell the Americans throughout the war, the garrison comprising the best troops in the colonial army.

Fort Wayne, Ind., a city and county seat of Allen Co., 148 m. s.e. of Chicago and 102 m. n.e. of Indianapolis, at the junction of St. Joseph's and St. Mary's rivers, which unite within the city limits to form the Maumee River, on the proposed Michigan & Erie Canal, a survey for which the government has ordered, and on the Cincinnati, Hamilton & Dayton, the Pennsylvania, the Wabash, New York, Chicago & St. Louis, the Grand Rapids & Indiana, the Lake Shore & Michigan Southern, the Lake Erie & Western and other railroads. The city is also the center for various lines of interurban roads which connect with the excellent electric system throughout the state. It is situated 770 ft. above sea level and covers an area of ten square miles. The surrounding country is largely agricultural; the city is an important manufacturing and trade center.

Parks and Boulevards. There are many miles of fine shade trees lining the well-paved streets and boulevards. The city contains over 100 acres of parks and nine miles of river front. There are many handsome residences and suburban homes. The park system includes the Swinney, Lawton, Hayden, McCullough, Reservoir, Piqua, Lakeside and Old Fort parks. Lawton Park contains a monument erected in honor of Maj.-Gen. Henry Ware Lawton. Old Fort Park is located on the site of the stockade built by Gen. Anthony Wayne in 1794.

Public Buildings. Among the noteworthy buildings are the courthouse, one of the finest structures in Indiana, Federal Building, Elks' Hall, Scottish Rite Cathedral, city hall, a number of banks, theaters and substantial business blocks. There are about 50 churches. The city is the see of a Catholic diocese and one of the largest constituencies of the Missouri Lutheran Synod.

Institutions. The educational insti-

tutions include the Concordia College (Lutheran), Sacred Heart Academy, Bible Training School, Art School, Conservatory of Music, Westminster Seminary for young ladies, St. Augustine Academy, a public library, public and parish schools, high school, college of medicine and surgery, school of oratory and several business colleges. Other institutions include St. Joseph's, Hope and German Lutheran hospitals, Indiana School for the Feeble-Minded, several orphan asylums, emergency home and a refuge for women.

Industries. Chief among the industrial establishments of the city are large railroad repair shops, iron and steel mills, car-wheel factories, knitting and hosiery mills, sash and door factories, boiler and engine works, carriage and wagon factories, flour mills, road-construction machinery, woodenware factories, electrical-machinery works, gas-machinery works and manufactories of gloves, caps, pianos and organs, shirt waists, paper boxes, harness and leather findings, soft drinks, oil tanks, cigars, furniture and washing machines.

History. The principal village of the Miami Indians, called Kekionaga, was situated on the east bank of the St. Joseph River within the limits of the present city. A French trading post was later established on the St. Mary's River, also within the present city boundary, in 1680. The Indian village was destroyed in 1790 and in 1794 General Wayne built the stockade fort which was named in his honor. The first permanent settlement was made in 1815. The town became the county seat in 1824 and in 1840 a city charter was granted. Population in 1920, U. S. Census, 86,549.

Fort William, a city of Ontario, situated on the north shore of Lake Superior, 861 m. from Winnipeg. Because of its railways and excellent harbor facilities it is one of the commercial and traffic centers of the province. The leading manufactures consist of car wheels, iron pipe, tinware, brick tile, wire nails, lumber, cigars, flour, oatmeal, cheese and aerated waters. Thirteen grain elevators have a capacity of 20,690,000 bushels. The first settlement was made by French traders in 1669. Population in 1911, 16,499.

Fort William Henry, a stronghold built by Sir William Johnson, in 1755, on the site of the present Caldwell, N. Y. During the early French and Indian troubles it was an important position, and from it some of the lesser expeditions against the French and their allies were started. On Aug. 2, 1757, Montcalm with 8000 men, one-fourth of whom were Indians, captured the fort. The garrison marched out with the honors of war, but the following morning, while being escorted to Ft. Edward by a French detachment, they were attacked by Indians and a large number were killed and captured in the massacre that took place. This episode figures in Cooper's *Last of the Mohicans.*

Fort Worth, Tex., a city and county seat of Tarrant Co., 30 m. w. of Dallas and 170 m. n. of Austin, at the junction of the Clear and West forks of the Trinity River and on the International & Great Northern, the Chicago, Rock Island & Gulf, the Ft. Worth & Rio Grande, the Houston & Texas Central, the Missouri, Kansas & Texas, the Texas & Pacific, the Colorado & Southern, the St. Louis, San Francisco & Texas and other railroads. The city is attractively situated on a plain above the river and has an elevation of 700 ft. above sea level. The surrounding country is largely agricultural. The city is the center of a vast stock-raising and cotton-growing region, and it is one of the great distributing points of the Southwest. The wholesale and jobbing interests are also important factors in the city's progress.

Parks and Boulevards. The city is well laid out and contains many miles of improved streets and handsome residence districts. There are 21 parks with an area of 311 acres.

Public Buildings. Among the noteworthy buildings are the courthouse, constructed of granite and marble from the Texas quarries, a city hall, two fine railway stations, Elks' Club Building, a

Carnegie library, fine hotels, about 15 banks, substantial business blocks, modern office buildings and about 86 churches.

INSTITUTIONS. The city is the seat of the Texas Christian University, with a medical school department, Polytechnic College (Methodist Episcopal South), established in 1890, Baptist Theological Seminary, St. Andrew's School (Protestant Episcopal), St. Ignatius Academy (Catholic), the Texas Masonic Manual Training School and about 27 other colleges and schools. The benevolent and charitable institutions include St. Joseph's Infirmary, Texas State Masonic widows' and orphans' home, a number of private hospitals and sanatoriums and All Saints' Hospital.

INDUSTRIES. Extensive packing houses, flour mills, tanneries, machine-shop and rolling-mill plants, grain elevators and foundries are the chief industrial establishments of the city. There are manufactories of woven-wire beds, furniture, trunks, mattresses, confectionery, overalls, Italian paste, cigars, shoes, elevator cages and other diversified products. The city has just completed a reservoir for its water supply with a 31,000,000,000-gallon capacity, and has one of the largest and most modern electric-power plants in the Southwest, costing $2,000,000 and distributing electricity commercially 150 m. from the city.

HISTORY. In 1849 a military post was established here which was called Camp Worth. The name was later changed to Fort Worth. The fort and settlement were named in honor of Gen. William Jenkins Worth, who served in the War of 1812. In 1841-42 General Worth commanded the United States forces against the Seminole Indians. The city was incorporated in 1873, and in 1907 adopted the commission form of government. Population in 1920, 106,482.

Fo'rum (Roman), the central space in the city of Rome designed as a meeting place for the people, either for business or pleasure. Originally it was merely the open space in the lowlands surrounded by the Palatine, Capitoline and Quirinal hills and served as a common meeting ground for the various tribes on the hills. When Rome became a united city the Forum was improved, encircled by shops and made a public ground in the business quarter of the city. The temples of Saturn, of the Dioscuri and of Concord were built before 300 B. C., but it was practically two centuries later before the first justice courts were constructed there. From this time the Forum was crowded with beautiful buildings and became the meeting place of the Senate. Monuments and statues adorned the place, but now only the ruins remain. The familiar pictures of the Forum show the colonnaded style which was adopted in the construction of the buildings and which was later copied in other cities. Recently the Italian Government has been making excavations about the Forum and is preserving the valuable relics found there. See map in the article ROME, ANCIENT.

Fos'sils, the remains of organic bodies which were buried in the earth in past geologic ages and which are now found in rock formations. They are of interest and value as showing the successive forms and conditions of life which have appeared on the earth in the several geologic periods. Fossils show that plant life preceded animal life and that the simplest forms of each appeared first, the more complex forms following as conditions prepared the way for their development. The earliest plant forms were seaweeds and rushes, and the first animal species was the Mollusk of the simplest structure.

Each successive era of the earth's history has been marked by the predominance of some particular life form. Following the Mollusks the lowest forms of Vertebrates appeared in the Silurian Period, during the latter part of which and in the Devonian Period Fishes were the predominating form of life. Reptiles, Birds and Mammals followed successively, and, after untold ages, the species, among them man, which exist at the present time. The traces of the successive stages of evolution are fragmen-

tary. In some cases all actual remains of a species are lacking, and the only records left for the geologist are footprints made in sand or other yielding material, which afterwards solidified. See GEOLOGY; PALEONTOLOGY.

Fos'ter, George Eulas (1847-), a Canadian statesman, born in New Brunswick and educated at New Brunswick, Edinburgh and Heidelberg universities. For some time he engaged in teaching, finally becoming classics professor in New Brunswick University; from here he resigned, however, in 1879, to lecture throughout Canada and the United States, chiefly on temperance and prohibition. An Independent Conservative, he has sat in the House of Commons for Kings and for York, N. B., 1882-1900, and for North Toronto since the general election of 1904. Meanwhile, he was successively minister of marine and fisheries and minister of finance, under Sir John A. Macdonald, and minister of finance in the following administrations until 1896. As minister of marine and fisheries, he prepared the Canadian side of the deep-sea fisheries case for the committee that sat at Washington, 1888, and which resulted in the Chamberlain-Bayard Treaty. In 1903 he made a series of speeches throughout the large cities of Great Britain in support of imperial trade preference. Mr. Foster became minister of trade and commerce, October, 1911, and has been acting premier.

Foster, John Watson (1836-), an American statesman and diplomat, born in Pike County, Ind. He was educated at the Indiana State University and at Harvard, was admitted to the bar and practiced law in Evansville, Ind. During the Civil War he served with distinction. Foster was engaged for some time in journalism after the war, and in 1873-1880 was minister to Mexico. In 1881 he was minister to Russia and in 1883, to Spain. In 1893 he went to Paris as a member of the court of arbitration in the Bering Sea Controversy. By the desire of the Emperor of China, he took part in the negotiations of peace to close the war between China and Japan. He has also acted as envoy of the United States in international arbitration. Among his writings are *A Century of American Diplomacy* and *American Diplomacy in the Orient.*

Foster, Stephen Collins (1826-1864), a gifted American song writer, born at Lawrenceville, Pa. He was educated at Jefferson College, Canonsburg, Pa., and learned when very young to play several instruments. His creative impulse received its stimulus in melodies heard in the negro cabins. He was irresponsible and pleasure-loving; and he died in abject poverty. Among his numerous negro songs are *The Suwanee River, Massa's in the Cold, Cold Ground, My Old Kentucky Home,* claimed by one E. P. Christy and first published with his name, and *Come Where My Love Lies Dreaming.*

Fosto'ria, Ohio, a city of Seneca county, situated 13 m. n.w. of Tiffin and 35 m. s.e. of Toledo, on the Baltimore & Ohio, the Lake Erie & Western and other railroads. Oil fields are found in the vicinity and the surrounding country is a fertile farming region. The city is an important manufacturing center and contains flour mills, brass and iron works, a carriage factory, planing mills, stave and barrel factories, glass factories, a safe factory, carbon works, machine shops and spoke and bending works, and numerous other industries. The city was named in honor of Charles Foster, governor of Ohio in 1879 and 1881, and secretary of the United States treasury in 1891-93. Population in 1920, U. S. Census, 9,987.

Foucault, *Foo"ko',* **Pendulum,** the name applied to a simple pendulum so mounted as to demonstrate the rotation of the earth on its axis. If a very heavy weight be hung by a long fine cord free from twist and set to swinging north and south, it will continue to vibrate in the same plane passing through the center of the earth, but this plane will gradually shift its direction on the earth's surface, due to the rotation of the earth under it. Such a pendulum at the North

Pole would change its direction of vibration 360° in 24 hours, as the earth would rotate under it once in the 24 hours. At the equator it would not change its direction at all; at latitude 40° it would gradually change its direction 9° 40′ in an hour, requiring about 37 hours for its plane of vibration to make a complete revolution. This experiment was first performed by the French physicist Foucault in 1851; he used a heavy ball of copper hung by a wire over 160 ft. long, from the dome of the Pantheon in Paris. See PENDULUM.

Foun'dry, an establishment designed for making metal castings. When the term is used without qualification it means a foundry for casting iron. The implements required are a cupola for melting the iron, patterns of the articles to be cast, molds into which the molten iron is poured, molder's sand for packing around the pattern to form the mold and ladles for carrying the molter.

The cupola consists of a cylindrical furnace lined with fire brick, having a bottom which opens downward, a low chimney, and air pipes opening into it near the bottom and through which the blast of air is driven through the fire. Just above the hearth is an opening through which the molten iron is drawn off. The iron to be melted is broken into small pieces, and with the necessary amount of coke, is fed into the cupola near the top. The fire is lighted at the bottom and the blast applied. The molds are made by placing the patterns in boxes made for the purpose and pounding damp molder's sand around them. A small opening is then made in the sand and the mold is ready for use. The iron solidifies quickly, and within a few moments after the iron is poured, the boxes are opened and the castings taken out. See IRON AND STEEL.

Fountain, *Foun' tin.* In the ordinary sense the term denotes an ornamental, artificial basin having jets of water. Fountains are usually connected with the water system of a city, from which they get their water under pressure or by means of pumps, and they frequently supply drinking water for man and animals. The Greeks and Romans gave considerable attention to fountains, as is indicated by the remains of fountains in many of the ancient cities of the Mediterranean coast. Modern fountains are fashioned largely from those of the Greeks, which were highly ornamental, and in many cities and towns in Europe and America there are to be found fountains justly celebrated for their beauty. Those most famous in Europe are the Schöne Brunnen at Nuremberg, Germany; the Fontana Maggiore at Perugia, Italy; the Fontaine des Innocents, in Paris; the fountains and cascades at Versailles and St. Cloud, in France; and the Alameda Fountain at Malaga, Spain. In some of the expositions ornamental, symbolic fountains were conspicuous, among them the Fountain of the Republic, by Macmonnies, at Chicago, in 1893; the fountains of Man, Nature and Progress at Buffalo in 1901 and the Cascades at St. Louis, in 1904. See EXPOSITION, INDUSTRIAL.

Electric fountains are those which are illuminated through variously-colored glass plates, producing on the jets of water many beautiful effects.

Fouqué, *Foo"ka',* **Friedrich Heinrich Karl,** BARON DE LA MOTTE (1777-1843), a German poet and novelist, born in Brandenburg. He was a Romanticist, and is remembered for his fantastic *Undine,* one of the most charming of German fairy stories. Among other productions are *The Magic Ring, Aslauga's Knight* and *Sigurd the Snake-Killer.*

Fourier, *Foo"re a',* **François Marie Charles** (1772-1837), a French socialist, founder of Fourierism, born at Besançon, France. His father was well-to-do and gave him a good education in the college in his native town. After completing his studies, in which he excelled, he became a merchant's clerk, and in this capacity made business trips throughout France and into Germany and Holland. He inherited about $25,000 from his father, and engaged in trade at Lyons, but lost his property when the city was besieged by the troops of the Conven-

tion in 1793. After serving for two years in the army, he secured employment in a mercantile house in Lyons, undertaking later a small brokerage business of his own. During the remainder of his life he thus met his expenses and devoted his leisure time to elaborating his program for the reorganization of society, publishing his books out of his meager earnings.

Fourier's investigations were begun as a result of the fact that while a young man he had been required by his employers to hold a quantity of rice for higher prices until it spoiled, while thousands of the poor were starving for lack of food. His social system was aimed at the relief of poverty by the elimination of the waste of competition and extravagant methods of selling goods. It advocated the division of society into companies, or phalanxes, each of which, subdivided into series and groups on the basis of "passional attraction," should produce as far as possible all the necessaries of life required by its members, and distribute them through a common storehouse at cost, thus getting rid of the middleman. A minimum allowance was to be made to each individual, and the remaining proceeds of industry were to be distributed according to a fixed percentage between capital, labor and talent. Colonies founded upon the principles of Fourierism have been attempted in Europe and America, but without great success.

Four-o'clock, a native American herb of the Marvelwort, or Four-o'clock Family. It is found wild in Texas and South America and is elsewhere cultivated for ornament. The roots are large and thick, the leaves somewhat heart-shaped. The showy flowers, which grow in profuse clusters, are of all colors, generally tubular in form, and open on cloudy days or in the late afternoon; hence its name. It blooms all summer.

Fowl, Domestic, a name applied especially to the cock and hen when raised for food or for the eggs. Occasionally guinea fowl are also understood as included under the same term. Fully 96 per cent of the poultry raised in the United States belongs to this class, and their eggs even more than their flesh constitute an important article of food. There are over 280,000,000 fowls kept upon farms or in small flocks in the United States, and their value is estimated at over $150,000,000. The number of eggs produced annually is over 1,300,000,000 dozens, and yet this provides only about 200 eggs per annum for each person. The states which produce the most of these are Iowa, Ohio, Illinois, Missouri, Kansas, Indiana, Pennsylvania, New York and Michigan.

Chicken Raising. This is an important industry, owing to the great number of eggs and fowls needed to supply a constantly increasing city population. To raise chickens easily and with financial success, arrangements should be made to give them clean, comfortable quarters near enough to the barnyard for them to pick up any scattered grain. The buildings should be well ventilated and warm in winter, though cool in summer. Cement floors and earth floors are apt to be damp, and wood floors are apt to be too cool unless they are double and lined with building paper. Cement floors covered six inches with earth are probably the most satisfactory, but are also expensive. Roosts at a convenient height should be provided. If the chickens must be continually confined, they should have from 6 to 15 sq. ft. for each adult.

If possible, the yard should be upon a gravelly slope, protected from wind and seeded with grass or clover. Here the chickens may get plenty of exercise, which is a necessity to their growth. In the yards there should be from 50 to 120 sq. ft. of space to an adult. Coops for young chickens are of various kinds; formerly the most common were the box-like or tentlike coops with slatted fronts. Modern coops resemble small houses or are in the form of rectangular boxes, which are divided into two or more compartments. Wire netting is used in place of slats, and the boxes are so arranged that they are easily cleaned and are well ventilated.

STANDARD VARIETIES OF CHICKENS

The most convenient nests are merely straw-filled boxes located in various parts of the shed. Trap nests are arranged to imprison or to separate from the rest of the flock the hens which lay; they are of different devices, and by means of them the farmer may know which hens are providing the eggs. There is a great difference in hens in their desire to set or to hatch their eggs; many lay throughout a season without showing impulse to remain on the nest. Broods are now ordinarily hatched in incubators, as by this means several hundred can be hatched at once. Brooders are artificially warmed compartments designed to care for incubator chickens. To hatch, eggs require a constant temperature of about 104°. Great care should be taken that fowls have fresh, pure water and plenty of grain, green food and some animal food. Too much corn is fattening and is apt to lessen laying; wheat is now considered a better poultry food. The food should contain lime and plenty of grit to aid in digestion.

Breeds. Among the favorite breeds in the United States are Plymouth Rocks, Wyandottes, Orpingtons, Rhode Island Reds, Cochins, Brahmas and Leghorns. Of these the Plymouth Rock is the most popular both for food and for egg producing. The barred Plymouth Rocks are especially pleasing in appearance. The standard weight of a cock of this breed is nine and one-half pounds and of a hen seven and one-half pounds. The Brahmas are probably best for eating purposes alone, and the Leghorns are the most prolific layers. If kept clean, given plenty of water, exercise and wholesome food, chickens are not difficult to care for, and, aside from their value for their meat, eggs and feathers, they do great good in destroying harmful insects, while their damage to gardens is not apt to be great if they are otherwise provided with green food. Consult Watson, *Fowls, Care and Feeding;* United States Department of Agriculture, *Farmers' Bulletin 41;* McGraw, *The Plymouth Rock* and *The Wyandotte;* Collingwood, *The Business Hen;* Watson, *Farm Poultry.*

Fow'ler, Charles Henry (1837-1908), an American Methodist Episcopal bishop, born in Burford, Ontario, and educated at the University of Syracuse and at Garrett Biblical Institute, Evanston, Ill. He was pastor of churches in Chicago for several years, but left the pastorate to become president of Northwestern University. This position he held from 1872 to 1876, when he was chosen editor of the *Christian Advocate,* the leading paper of the Methodist denomination in America. Dr. Fowler became missionary secretary in 1880, and was made a bishop in 1884. In a tour of the world, which he began in 1888, he founded Peking and Nankin universities in China, and in Russia organized the First Methodist Episcopal Church in St. Petersburg. Upon his return he assisted in founding the Nebraska Wesleyan University.

Fox, a wild member of the Canine, or Dog, Family but differing from other members of this family so widely that by some authorities it is placed in a class by itself. The most common representative of this species is the American red fox, which is found in the northern regions of America and Asia and is probably only a variety of the European red fox. It is a smaller and more delicate animal than the wolf, with pointed muzzle, erect ears, slender body and legs; its tail is bushy and is the brush prized by English huntsmen. Though it is called the red fox the color of its fur is variable, being generally yellowish-red but often black, frosted or pale yellow; in the frosted varieties the hairs are black but tipped with white, and the pelts of this variety as well as of the yellow are very valuable to furriers. The red fox is a burrow-dwelling animal and often constructs ample underground apartments of three rooms, one of which is often his storeroom.

The grey fox is a Southern species, smaller than the red fox, with beautiful, red-tinged, silver-gray fur; it makes its home in hollow trees and lives upon eggs, poultry and fruit; the latter it secures by climbing trees with great agility. The

Arctic, or blue, fox is a Northern species, common in Alaska, Iceland and Greenland, and has been described by all polar navigators. Its fur is of great value. Other species known in America are the big-eared California foxes, Alaskan foxes and the swift kit foxes common on the plains. All of these are credited with the same cunning given, in the old medieval epic, to Reynard the Fox, who outwitted all his enemies by his stratagems and stealth.

Although the fox has been noted in the legends and folk tales of all lands for its slyness and cunning, stories of its skill are probably somewhat exaggerated. It does, however, display remarkable intelligence in facing new difficulties and adapting itself to new conditions. This is partly accounted for in its having to act both as hunted and hunter, for it is the prey of man, wolves and mountain lions, and itself hunts Rodents, poultry, birds, frogs and reptiles. Its methods are interesting for it can out-distance most animals, and employs numerous stratagems in securing its prey or baffling its enemy. The sport of fox-hunting, popular in England, is not widely practiced in the United States, though, in the South, European foxes, said to display more cunning than the American varieties, have been imported for the hunt.

Fox, a tribe of the Algonquians whose familiar name was given them by the French. They called themselves the Muskwakiuks, or Red-Earth People. They first occupied the Lake Superior region but were driven southward by the Ojibways and, later, by the French. In self-defense they united with the Sauks, and the two tribes gradually fused. The members of the tribe are now few in number and live in scattered localities in Kansas, Nebraska, Oklahoma and Iowa.

Fox, or **Nee'nah, River,** a river of Wisconsin, rising in Green Lake County in the south-central part of the state. It flows southwest almost to the city of Portage on the Wisconsin River, with which the Fox is united by a canal. From there it winds in an east-northeasterly direction until it passes through Lake Winnebago; thence it flows north, entering Green Bay, a long arm of Lake Michigan. The stream is important commercially since it forms one of the channels connecting the Mississippi and the Great Lakes. Its length is practically 250 m. The largest cities upon the stream are Oshkosh, Appleton, Green Bay and Portage.

Fox, Charles James (1749-1806), an English statesman. He entered Parliament in 1768 and was a member of the cabinet under North from 1770 to 1773, and under Rockingham in 1782 as secretary for foreign affairs. He opposed the coercive policy of Great Britain in regard to the American colonies, and also opposed the war with France. Fox ranked among the leading orators of his age. He was the friend of Burke, Gibbon and Johnson, and the political rival of Pitt.

Fox, George (1624-1691), the founder of the sect called Quakers or Friends, born at Drayton in Leicestershire, England. In his youth he was a shoemaker's apprentice, but at the age of 19 years he became convinced that he was called to be a reformer. He wandered from place to place preaching and teaching that the Holy Spirit rather than the Bible was the source of divine truth, and consequently the authority according to which man should live. He taught simplicity of religious life, wore his hat on all occasions and affected certain peculiarities of dress. He was persecuted and several times imprisoned. Fox traveled and preached in the West Indies and Europe, and visited America with Penn, Barclay and Keith. His followers were called Quakers from certain trembling and shaking motions which they practiced, "trembling before the Lord." Fox was distinguished for his doctrine and life of "peace on earth, good will toward men," which also characterized his followers. See FRIENDS.

Fox, John, Jr. (1863-1919), an American novelist, born in Bourbon County, Ky., and educated at Harvard University. After spending some time in newspaper

work and business, he settled at Big Stone Gap, Va., making here the study of mountain life that gives vitality and interest to his novels. Among his popular stories are *The Kentuckians, The Little Shepherd of Kingdom Come, Knight of the Cumberland* and *Trail of the Lonesome Pine.* He published an account of his experiences as a correspondent in the Russo-Japanese War under the title *Following the Sun Flag.*

Foxe, *Fox,* **John** (1516-1587), an English Church historian, educated at Oxford. He was a fellow of Magdalen College and in 1545 was expelled for heresy, but later was ordained deacon of the Anglican Church, being variously connected with Reigate, the Cathedral of Salisbury, Cripplegate and Durham. In 1575 he interceded with Elizabeth for the Dutch Anabaptists. He is immortalized by his *History of the Acts and Monuments of the Church,* or *Foxe's Book of Martyrs.* The first English edition appeared in 1563, and it was placed in every Episcopal palace in England. The book has gone through innumerable editions, and is very widely known.

FOXGLOVE

Foxglove, a corruption of folk's-glove, a European herb of the Figwort Family, which has become common in the United States through cultivation and escape from gardens. It is a sturdy plant with showy flowers, which in shape resemble glove fingers. The leaves are pointed and somewhat downy. The flowers, which are crowded on a long stalk, are white or pale purple and sometimes spotted. From the shape of the flower, foxglove has been given many fanciful local names, such as fairy-bells, fairy-thimbles, lady's-glove, lady's fingers, dog's finger, rabbit's flower, etc. It blossoms all summer. Two native American members of the same family, whose flowers are yellow and more regularly tubular, have been named smooth false foxglove and downy false foxglove from their likeness to their European cousin.

Digitalis, a drug derived from the leaves and stems of several species of foxglove, is valued as a cardiac sedative.

Foxhound, a species of hound, a cross between the greyhound and the old English hound, which has been bred in England for the sake of the hunt. It is a medium-sized dog with straight protruding muzzle, long, silky ears, strong legs and erect tail; the coat is short-haired and smooth, generally black, white and tan in color. It is noted for its swiftness and endurance and is said to travel faster than the fastest horse and for a longer distance without rest. The foxhounds' enjoyment in the chase and their zeal in its continuance for extraordinary distances render them favorites among English lovers of the sport.

Foxtail Grass, a common member of the Grass Family, found growing in meadows where it has been self-sown or is planted for hay and fodder. Some species are found by roadsides and there, or when found among other crops, are classed as weeds. It has received its name from its bushy spike of stems which is really a number of much-contracted, short-stemmed clusters. Its stems are hollow and its leaves long, sheathing the stem in the same manner as do those of most grasses. A species called bottle grass or green foxtail grass is lighter green than the other species; and a cultivated species is tall, growing three or five feet high, and is locally known as Italian millet, Bengal grass or Germanica.

Fox Terrier, a dog of the terrier species common as a pet, but deriving its name from its former occupation of driving foxes from their holes. It is a bright, intelligent dog, full of play and quick

and active in its movements. The head is small, the muzzle black and protruding, the ears long and inquisitive. Its slender body has a short, silken coat generally black and white, or black, white and tan in color. The tail is stiff and straight. The fox terrier is one of the most easily educated of dogs and its compact build makes it pleasing in appearance.

Fra'mingham, Mass., a town of Middlesex Co., 24 m. s.w. of Boston, on the Sudbury River and on the New York, New Haven & Hartford Railroad. The villages of Framingham Center, South Framingham, Saxonville and Nobscot are included in the corporate limits of Framingham. South Framingham is the chief business and banking center. It has manufactories of boots and shoes, paper boxes, gummed labels, chairs, rubber, straw goods, tags, crape paper and other articles. Saxonville's manufactures include woolen yarns, worsted cloths and wool blankets. A state normal school and home for the aged are located in Framingham. It was settled in 1647 and known as Danforth's Plantation until 1700, when it was incorporated and the name changed to Framingham from the English town of Framingham. Population of the town in 1920, 17,033.

France. A republic of Europe bounded on the north by the English Channel and the Strait of Dover; on the east by Belgium, Luxemburg, Germany, Switzerland, and Italy; on the south by the Mediterranean Sea and Spain; on the west by the Bay of Biscay and the Atlantic Ocean. The shape of the country is that of a hexagon, with a greatest length from the North Sea to the Pyrenees of about 550 miles, and a maximum breadth from the Bay of Biscay to the Rhine of about 400 miles. Its area in Europe including Corsica and other islands is 212,734 sq. m. It is the second European nation in size.

Owing to its geographical location, the western outlet of Europe, France became the thoroughfare of commerce and ideas between the old and the new world.

SURFACE. The territory of France forms a physical unit, due to its natural boundaries on all sides, its boundary line being almost equally divided between coast and frontier. On the east a series of mountain ranges, including the Alps, Jura, Vosges, Rhenish Highlands and Ardennes, form a boundary, broken by passes, which facilitate commercial communication with the rest of Europe. The Pyrenees, on the other hand, are an almost impassable barrier, except around the extremities, between France and Spain. The coast line, about 1950 m. long, is variably one of rocky cliffs or low sandy dunes, bordered by barren moors. The interior of France consists of highlands principally to the south and east, a great central plateau, a less elevated plateau in Normandy and Brittany and the plains in the northern and the western part. The average elevation of the land, about 1000 ft., diminishes in the western part to about 650 ft. and less. Here are the basins of the Garonne, the Seine and the Loire. The great central, or Archæan, plateau extends west of the Rhône and south of the Loire River. Near the Mediterranean is its separated border, called the Cévennes, and the mass as a whole stands out boldly against the sea. Near the middle of the plateau are gorges, deep ravines and inundations showing the effects of volcanic eruptions. Beyond it are the fertile plains of western and northern France.

RIVERS AND LAKES. The Rhône, entering from Switzerland and piercing the gap between the Alps and the Jura, is the largest river of France. It drains the southeastern part of the country into the Mediterranean, and has as its important tributaries the Saône, Ain, Gard, Ardèche, Isère, Durance and the Drôme. The Garonne, Seine and the Loire constitute the other important drainage systems. The area of the basin of the Loire is approximately 46,000 sq. m. It collects the waters of the Allier, Indre, Vienne-Creuse, Cher, Loir, Mayenne and Sarthe, and drains west-central France. The Garonne receives the waters of the

SOME WONDERS OF MODERN PARIS

THE PALACE OF THE LOUVRE

In this group of buildings are gathered the most valuable art treasures in the world.

PARISIAN STREET SCENE

A view of the Boulevard de la Madeleine. To the left are the pillars of the Bourse.

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THRESHING SCENE AT PUNTY, FRANCE

southwestern part of the central plateau from the Dordogne, the Tarn-Aveyron and the Lot rivers, and at its mouth is joined by the Gironde, forming a large estuary. The Seine is of great commercial importance, and is navigable from Paris to the sea. The whole of France is connected by means of natural or artificial waterways, and since they carry about half the trade of the country the rivers of France have great commercial significance.

The lakes are few and unimportant. The largest, partly within the boundaries of the country, is Lake Geneva, principally a Swiss possession. The Alpine region and the Rhône basin contain a few lakes, among which are Annecy and Bourget.

Climate. In general, the climate of France is temperate. The prevailing winds are from the west and southwest, and they, together with the warm ocean currents, temper the climate, which grows continental when no longer within reach of their influence. Hence the summers on the eastern frontier are extremely hot and the winters are long and severe. In the neighborhood of the Cévennes, as well as the Alps, are bitter winds and perpetual snows. On the Mediterranean coast the temperature becomes subtropical, due to the high ranges, which prevent the entrance of cold winds. At times, however, a local wind known as the mistral sweeps over this region with such violence as to cause great havoc; it is chilling, but a general clearing of the atmosphere is the beneficent influence attendant upon it. The mean annual rainfall of France is about 29½ inches, a maximum of 71 inches falling in the neighborhood of the Pyrenees, and a minimum of 19½ inches along a part of the Mediterranean coast.

Minerals and Mining. The most valuable mineral resources of France are coal and iron. The coal fields, comprising a territory of 2100 sq. m., are widely distributed, the principal deposits being found in the neighborhood of Valenciennes and Saint-Étienne. The yield of bituminous coal is the largest, though small amounts of anthracite are found in the Department of Isère. Despite the fact that wood is the chief fuel, the coal supply does not suffice for home consumption, and large amounts are imported from England and Belgium to meet the demand of industrial France. With the return of Alsace-Lorraine the iron industry of France will soon become prominent for from Alsace came three-fourths of the iron used by Germany in the days preceding the World War. Those rich iron deposits now belong to France along with the coal and other mineral wealth of the province. France also produces lead, copper, zinc, antimony, and manganese and is rich in building stones; marble, slate, cement, phosphates and millstones are extensively quarried. The precious metals are few.

Fisheries. One of the important industries, carried on in France on a vast scale, is its fisheries. About 145,000 of the inhabitants are engaged in the work. The catch consists chiefly of herring, oysters, mussels, anchovies, tunnies, pilchards, mackerel and sardines. The breeding of oysters is constantly growing in importance.

Agriculture. For centuries agriculture has been the chief occupation of the inhabitants of France, and the French peasant and landholder have long been significant types. About one-half of the territory is under cultivation, and agriculture and forestry give employment to 8,000,000 people. Along the Garonne and the Rhône rivers the land is very fertile, while the barren regions belong principally to the neighborhood of the Alps and the Pyrenees. The forests are not important, but pine, spruce, beech, ash, oak and other varieties of trees are found. The destruction of the national forests has been extensive within recent years. Among cereals, chief prominence is given to the cultivation of wheat. Oats, rye, barley, potatoes, hemp, flax, beets, maize, buckwheat and rape are grown. The productions of the vineyards of France, as well as different kinds of fruit, are famous. The or-

ange, lemon and olive are found in the south; the pear, peach, plum, apple and cherry in the north. For a long time the vine has represented one of the chief sources of its agricultural wealth, the climate and soil of the country being especially favorable for its growth. The finest grapes come from Champagne, Bordelais and Burgundy, the wines of Burgundy being known the world over. The apple is grown, chiefly in Normandy, and the production of cider is fairly large. Among nuts, the chestnut forms a staple food among the poorer classes in the mountain regions of Corsica and Auvergne, and is extensively exported. The chief industrial plants are beets, mulberry tree (for silk production), colza and tobacco. Attempts have been made to increase the area of natural meadow and pasture lands in order to meet the demands of stock breeding, which remains of secondary importance. The chief attention is given to the breeding of sheep and of fine horses for the army. Formerly the land was in the hands of the peasantry and was fairly equally distributed into small portions for each farmer. The tendency within recent years has been to increase these to large estates, which are then subplotted.

Manufactures. Due to lack of natural resources, France has been unable to hold her own in the industrial competition among nations, since the new industrial appliances have been introduced. Beauty, elegance and artistic finish are characteristics of her most distinctive products, and these yield rather pleasure to the eye than a fine net total of financial gain. The most important is the textile industry, and the production of silk, ranking third in amount, is the most superior in artistic finish. Millinery goods, kid gloves and small articles are also important. The linen goods have reached a high grade of perfection. Chemicals, glass, paper and pottery are manufactured. The metal industry is significant, chief attention being paid to smaller metalware. The jewelry, mirrors and surgical instruments are famous. The government monopolizes the tobacco industry, and alcohol, wine, beer and refined sugar are manufactured in large quantities.

Commerce and Transportation. Recent years have witnessed a marked increase in both imports and exports. The chief imports are coal and raw materials, only about 18 per cent of the total amount consisting of manufactured goods. About one-fourth of the exports are raw materials, and one-half are manufactured goods. Textiles, raw wool and yarn, clothing, linen, wine, chemical products, raw silk and leather goods are among the leading exports. The United Kingdom receives the largest per cent of the exports of France, and is, in turn, drawn upon for the greatest bulk of imports. Other countries with which important commercial communications are maintained are the United States, Germany, Belgium, Argentina, Russia and Algeria.

Methods of transportation represent a high state of perfection. Reference to the system of waterways, by means of natural river basins and artificial canals, has already been made. The largest canals are the Canal du Midi, or Canal of Languedoc, connecting the Atlantic Ocean with the Mediterranean Sea and crossing the southwestern part of France; the Rhine and Rhône Canal, uniting the two rivers so named; the Canal of Bourgogne, joining the Seine, Yonne and Saône rivers; and the Canal du Centre, connecting the Saône and the Loire. The railway system is one of the best in Europe, its mileage being surpassed only by that of Germany and Russia. The six large trunk lines of railway of the country are the Paris-Lyons-Mediterranean, the Southern, the Paris-Orléans, the Western, the Northern and the Eastern. All except the Southern Railway converge upon Paris. The railways are in the hands of private individuals, but are strictly controlled by the government. There are three kinds of highroads in the country: national, departmental and communal. They are admirably maintained and organized, and

are a heritage of magnificent engineering skill, dating back to the days of ancient France. The total length of railway lines in 1909 was 30,000 m.; of telegraph lines, in 1908, over 96,000 m.; of navigable rivers, 5480 m.; of canals, 3075 m.; of roads, 62,540 m.

INHABITANTS. There are several different races represented in the country, chiefly the Iberian element in the southwest, the Ligurian on the shores of the Mediterranean, and the Germanic and Scandinavian in the northwest. The Celtic type, inhabiting the territory between the Garonne and the Seine rivers, is short of stature, has dark hair and a broad head. The Celts (and this characterization applies more or less to the French people as a whole) are vivacious and temperamental, with alternating moods of gayety and depression; they have a mind that responds quickly to logic and organization; they are lively and frank and have admirable qualities of thrift and industry, as well as genuine love of the soil. In Normandy is the tall, light-haired and blue-eyed type, resembling the Teutonic invaders. A darker type is found in Champagne and in the neighborhood of the Vosges and the Perche. In southern France, a short stature and dark hair and eyes prevail. Many European countries surpass France in density of population, and while at the beginning of the 19th century only Russia exceeded France in population, by the last half of the century France had fallen to fifth place among European nations, an unusual decline.

GOVERNMENT. The Government of France is a centralized Parliamentary republic. Monarchical traditions prevail, however, and the president, or chief executive, is not elected by popular vote but by the two chambers of the legislative assembly, a majority of the total number being necessary for election. The constitution provides for this legislative body, consisting of a Senate and a Chamber of Deputies. The Senate is nominated by a special electorate; the Chamber of Deputies is elected directly by universal male suffrage for four years. The local government of France is now controlled by departments, at the head of each of which is a prefect appointed and removed at the pleasure of the chief executive. Below the department is the arrondissement, four belonging to each department and each serving as an administrative and election district. Smaller and less important units are the canton and the commune. There are 36,000 communes, and all except Paris are administered by a mayor elected by the municipal council. The council, elected by universal suffrage for a term of four years, is the deliberative body of the commune. Central administrative control is one of the prevailing characteristics of French local government, and an extraordinary degree of uniformity is obtained, though at a partial sacrifice of the fullest freedom in local self-government.

In the judicial system the highest court is the Court of Cassation at Paris, consisting of a first president, three presidents of sections and 45 judges. There are 26 Courts of Appeal hearing cases from the Courts of First Instance in the arrondissements; they in turn deal with appeals from decisions made by the justices of the peace in the different cantons. The army plays an important part in the national life of France, and the country has come to be recognized as a military republic. There are 2,500,000 men available of the 4,350,000 liable to military duty, and the national system of defense is maintained at a high degree of efficiency.

EDUCATION. For an account of the system see EDUCATION, NATIONAL SYSTEMS OF, subhead *France*.

LITERATURE. See LITERATURE, subhead *French Literature*.

RELIGION. The Catholic Church has numbered among its adherents 98 per cent of the population of France. Until 1905, when the bond was severed, the Catholic Church and the Jewish and Protestant confessions were subsidized by the State. In recent years there has been a movement of opposition to Catholicism, but both Protestants and Jews are

likewise gradually diminishing in number.

CHIEF CITIES. Foremost among the cities of France is Paris, the largest city of the Continent. Other important cities are Marseilles, Bordeaux, Havre, Lisle, Lyons, Versailles, Toulouse and Nantes. The three important seaports on the north are Dunkirk, Calais and Boulogne. The ports of the Seine are Paris, Rouen and Havre. On the Atlantic coast are Saint-Malo, Morlaix, Brest, Lorient and Nantes. The southeastern part contains many old Roman towns, including Orange, Avignon, Beaucaire, Nîmes, Cette and Marseilles.

HISTORY. In the time of the Romans the country was called Gaul and was inhabited by a people called Gauls, who had conquered the Celts, the earliest inhabitants. When Cæsar came into the country (58-50 B. C.) the quarreling tribes were subdued and Gaul came within the circle of Roman civilization and even furnished three Roman emperors.

Invasions. In the fifth century began a furious pouring in of the barbarians, which continued for over 100 years. Vandals swept over Gaul beyond the Pyrenees, while Franks, Visigoths and Burgundians settled within its borders. In 451 these tribes all united under the Roman general Aëtius and drove back the devastating Huns at the famous Battle of Châlons.

Church and Barbarians. The greater part of the barbarians were not orthodox, being Arians in faith, but this estrangement was happily changed for the Roman Church and for Gaul by the conversion of Clovis (See CLOVIS). This Frankish ruler and his sons conquered almost all Gaul. Under his descendants, called the Merovingian kings, the royal power declined and was absorbed in the office called mayor of the palace. Finally this office was made hereditary by the famous Pippin of Heristal. The family renown was increased by Charles Martel, who succeeded to his father's office, and who stood as the champion of the Church. Charles Martel saved Europe for Christendom and drove the Arab Mohammedans into Spain by the Battle of Tours in 732. The son of Charles Martel, Pippin the Short, sent the puppet Merovingian ruler to a monastery, and, seeking alliance with the Church, was crowned king by the Pope (See CAROLINGIANS). His son, Charlemagne, succeeded him and made even a closer alliance with the Church (See CHARLEMAGNE).

The empire of Charlemagne was divided into three parts by his descendants, in the Treaty of Verdun (843), and his grandson Charles received the territory of modern France as his share. The history of France proper begins at this time. The invasion of the Northmen increased the power of the nobles and feudalism secured a firm hold. The Carolingian kings, or descendants of Charlemagne, ruled with the royal power steadily declining until at the death of Louis V in 987, Hugh Capet, one of the greatest nobles of the country, founded the Capetian dynasty. For 200 years these kings struggled unsuccessfully to establish the royal power over the turbulent nobles. Louis the Fat (1108) was the first to succeed in controlling his own duchy. He tried to keep the highways free from robbers, but it was left for his grandson, Philip Augustus, to make the Duchy of France expand into a kingdom (See PHILIP AUGUSTUS). At the death of Charles IV (1328), as the Salic law excluded female succession, the crown passed to another branch of the Capetian family. Philip VI of the House of Valois became king. This led to a series of wars with England called the Hundred Years' War. France came out of this long conflict in an impoverished condition but with the English practically driven from the country, as they retained only the seaport Calais. See HUNDRED YEARS' WAR; JOAN OF ARC.

Louis XI (1461-1483), an unscrupulous king, put down the powers of the nobles and thus began the foundation of the absolute monarchy of France. Large fiefs came under his control and Brittany was added during the reign of his son Charles by his marriage with Anne of Brittany. Charles began the

series of Italian invasions. These were expensive campaigns and resulted in no addition of territory, but the invaders carried back the seeds of the Renaissance which was soon to flower in France under Francis I (See RENAISSANCE). This ruler began his reign by a successful campaign in Italy and was the generous patron of art and literature. He was defeated by Charles V, who claimed his conquered Duchy of Milan. When his son Henry II came to the throne he continued the war with Austria, as well as the persecution of the Huguenots (See REFORMATION, THE). Savoy was lost, but Calais was taken from the English. During the short reign of his son, Francis II, the House of Guise rose to power. His second son, Charles IX, was dominated by Catherine de' Medici, wife of Henry II, and there was a struggle between the Huguenots and Catholics. The religious wars continued under Henry III and ceased only when his cousin, Henry IV, became King of France.

With Richelieu as prime minister a new policy was adopted. The internal troubles were suppressed, nobles were put down and the power of France was extended abroad (See THIRTY YEARS' WAR; RICHELIEU, ARMAND JEAN). During the minority of Louis XIV, Mazarin was minister. Though more cautious than Richelieu, he carried on the plans of the great cardinal. Mazarin died when Louis XIV was a young man, and Louis undertook the task of ruling without a minister. By his extravagant court and reckless wars he left France burdened with an enormous national debt and with declining industries. Still another long minority of his grandson, Louis XV, followed, during which the public money was wasted, while the reckless extravagance was even worse during his long reign.

Thus France had reached the verge of financial ruin when Louis XVI, well meaning but incompetent, became king. Minister after minister tried to reform the finances until, as a last resort, a States-General was called in May, 1789 (See FRENCH REVOLUTION).

Napoleon became first consul in 1799, and the history of France and that of Napoleon are virtually the same until 1815 (See NAPOLEON I). Louis XVIII, brother of Louis XVI, ruled after the first abdication of Napoleon and was again restored after his fall at Waterloo. He at first made no attempt to destroy the great work of the French Revolution, but the emigrant nobles tried to bring about a reaction. The King was led by their influence to pass several oppressive measures. His brother, Charles X, who succeeded him in 1824, had been the leader of these reactionaries. He was overthrown in 1830, when the ministry tried to enforce ordinances suppressing the liberty of the press, and to give the people less choice in the elections. Louis Philippe was proclaimed constitutional king, but, elected as leader of the popular party, he soon began to oppose reform and was driven into exile in 1848. The new government was a republic with Louis Napoleon as president; four years later, he overthrew the republic and proclaimed himself emperor.

The modern history of France centers around two events. The first is the Franco-German War of 1870, which is considered elsewhere. At the conclusion of that unfortunate war, the republic was revived and France enjoyed forty years of peace.

The War of 1914. Germany's vast scheme of world conquest finally led to the war of 1914 in which France was at once involved. At this point, French history suddenly becomes of great interest to Americans. When we entered the European War, France was the field of activity. Millions of our soldiers fought with those of our other allies on the blood soaked fields of France. Rivers and hamlets of that country are invested with vivid interest since there, American soldiers untried in the arts of war, showed themselves not inferior to the disciplined veterans of Germany. America will not forget the self-sacrificing valor there displayed. Clement Arman Fallieres president from 1906 to 1913 was succeeded

by Monsieur Raymond Poincaré in February, 1913. Population in 1911, 39,601,509.

France, Bank of. See BANKS AND BANKING, subhead *Continental Banks.*

Francis I (1494-1547), King of France, succeeding his uncle and father-in-law, Louis XII, in 1515, and reigning for 32 years, a contemporary of Henry VIII of England and Charles V of Germany. He regained Milan in 1515, and on the field of battle accepted knighthood from the famous Bayard. He failed of election as Emperor of Germany in 1519, and declared war on his successful rival, Charles V. Defeated at Pavia and taken prisoner in 1525, he was released on hard terms a year later and renewed the war, exciting the indignation of all Christendom by forming an alliance with the Turks. A treaty for ten years was finally concluded between Charles and Francis in 1538, but when Charles undertook an unsuccessful expedition against Algiers, the King of France began war again in 1542. Charles won the aid of Henry VIII, and Francis was compelled to sign the Treaty of Crespy in 1544. He fostered art and learning, and built several of the finest palaces in Europe.

Francis II (1768-1835), Holy Roman emperor from 1792 to 1806 and ruler of Austria until 1835. He became Emperor of Austria in March, 1792, upon the death of his father, and in July of the same year was elected to the throne of Germany. His reign occupied the troublous years of the French Revolution, and under his direction the allied Prussian and Austrian armies invaded France, from which they were driven out. Later the war was continued on German territory, and in 1797 Napoleon entered Austria. By the Treaty of Campo Formio Francis was obliged to surrender Belgium and Lombardy, but received in return the lands of the Republic of Venice. In 1799 Francis formed an alliance with Russia and England and again took up the war against Napoleon, but was disastrously defeated at Marengo and Hohenlinden, and later at Austerlitz; this battle lost for Francis the Venetian territories and Tyrol, and the Holy Roman Empire was wholly dissolved. On Aug. 6, 1806, Francis laid down his imperial crown and thereafter ruled as Francis I, Emperor of Austria. Through the years of Napoleon's power Francis frequently hoped to regain his lost possessions, although by the marriage of his daughter with the French ruler a temporary peace was made. After the defeat of Napoleon at Waterloo, Francis joined in the formation of the Holy Alliance, whose reactionary policy he largely dictated under the guidance of his counselor, Metternich.

Franciscans, *Fran sis' kans,* (Minorites, also called Gray Friars), the first mendicant order of preachers, established by St. Francis of Assisi (1182-1226), a man of boundless piety and charity. They were the union of his first 12 followers, who were bound by a severe rule, which, to great learning added poverty so rigorous as to necessitate complete dependence on alms. In 1210 Innocent III gave verbal approbation to the new order which Honorius III confirmed in 1223. The Franciscans have done their greatest missionary work in Mexico, South America and in the East, where St. Francis himself labored. With St. Clare he established the Poor Clares for women. The order had a rapid growth in Italy, France, and Spain. At the first general chapter held at Assisi in 1219, upwards of 5000 friars were present.

Francis Joseph I (1830-1916). Emperor of Austria, nephew of Ferdinand I, whom he succeeded in 1848. At the time of his accession, Hungary was in a state of revolt, and in April, 1849, the country was declared a republic, with Kossuth as governor. In Italy, Charles Albert of Sardinia took up arms against Austria, but the Emperor was successful in quelling the outbreaks in both countries. In 1855 a concordat was concluded with Pope Pius IX, which was favorable to the Catholic Church throughout Austria. In 1859 Francis

Joseph engaged in a war with France and Sardinia, through which he lost Lombardy, and in 1866 occurred the disastrous Seven Weeks' War with Prussia.

In 1867, Austria and Hungary made a compact (Ausgleich) for a dual monarchy (See Austria-Hungary), and from thenceforth Francis Joseph was emperor of Austria and king of Hungary. Into his domestic life obtruded the sinister shadows of three tragedies. In 1899, his wife, the Empress Elizabeth, was assassinated; in 1899 his only son and heir suffered a mysterious death; in 1914, his heir apparent, the Archduke Francis Ferdinand, was murdered at Sarajevo, which last event was the ostensible cause of the war on Servia, the hasty prelude to the great European War itself. He was succeeded in 1916 by his nephew Charles I.

Francis of Assisi, Saint (1182-1226), founder of the Order of St. Francis, was born in Assisi, Italy. When he was about 28 years of age he formed a band of 12 companions and drafted rules for their government and mode of life. Pope Innocent III sanctioned the order in the year of its formation, and shortly afterwards they established themselves in a little house adjoining the Chapel of St. Mary of the Angels, in Assisi. The members of the order have acted as missionaries, unsupported, living by alms. St. Francis traveled in the East. He died in Assisi, and was canonized in 1228.

Francke, *Frahn' ke,* **August Hermann** (1663-1727), a distinguished German theologian and educator, founder of the Francke Institute at Halle, born at Lübeck. He graduated at Leipsic in 1685, became lecturer on theological subjects there in 1689, and in 1691 was called to the chair of Greek and Oriental languages in the new University of Halle. In 1698 he was transferred to the more congenial chair of theology. He remained in Halle for 36 years, teaching and acting as pastor of a small church in a neighboring town. Greatly moved by the ignorance in which children were growing up, he established a school, first for the poor, and later for the well-to-do. It grew rapidly. New buildings were erected, able teachers gathered around him, a school for girls was added and a department for the training of teachers. The success of Francke's Institute led to the founding of others and greatly influenced the Prussian public school system established by King Frederick William I.

Franco-German War, a war between France and Prussia, occurring in 1870-1. The Prussian defeat of Austria in 1866 aroused the jealousy of Napoleon III, and in 1870, when a Prussian prince of the House of Hohenzollern was considered as candidate for the throne of Spain, the French nation was displeased. The Hohenzollern candidate withdrew, but William I refused to yield to the French demand that no member of the House of Hohenzollern should ever, with his consent, be a candidate for the Spanish crown. The French were led to believe that their ambassador at the Prussian court had been dismissed, and war was declared.

The Germans were fully prepared. Three armies were immediately sent into France. The French imperial administration was revealed in all its hollowness, and nearly all the generals were incompetent. Defeat followed defeat until General MacMahon was completely overcome at Sedan, Sept. 1, 1870. Napoleon III was taken prisoner, and as soon as the news of Sedan reached the capital, there was a revolution and the Third Republic was proclaimed, with Trochu, Favre and Gambetta acting for the national defense.

The Germans now besieged Paris, and the French made the most strenuous efforts to relieve the city with armies raised in the provinces. Strassburg fell before the close of September, and, though the French won a few victories, the Germans had too securely invested the country to be driven out. After a four months' siege, Paris was taken Jan. 28, 1871, and peace was signed May 10, whereby Alsace, German Lorraine and Metz were surrendered by France, which also promised to pay a war indemnity

of $1,000,000,000. It was three years before all German troops were withdrawn from France. The chief results of the war were the establishment of the Third Republic of France and the German Empire. See FRANCE, subhead *History;* GERMANY, subhead *History.*

Frank'fort", Ind., a city and county seat of Clinton Co., 24 m. s.e. of Lafayette and 40 m. n.w. of Indianapolis, on the Lake Erie & Western, the Chicago, Indianapolis & Louisville, the Vandalia Line and other railroads. It is situated in a productive agricultural region and has a supply of natural gas which is used extensively for light and heat. The city contains manufactories of lumber, brick and tile, flour, agricultural implements, crackers and furniture. Railway repair shops are also located here. There is a large trade in grain, vegetables and fruit. Frankfort has a fine library and courthouse. Population in 1920, U. S. Census, 11,585.

Frankfort, Ky., the capital of the state and the county seat of Franklin Co., 55 m. e. of Louisville, on the Kentucky River and on the Louisville & Nashville, the Chesapeake & Ohio, the Frankfort & Cincinnati and other railroads. An electric traction railway connects the city with neighboring points. The river, here spanned by a suspension bridge 700 ft. long, is navigable for steamboats, which ply between Frankfort and Cincinnati, Louisville and other ports. Frankfort is the center of the famous Blue Grass section of the state; the land is highly productive and hemp and tobacco are extensively cultivated. It is surrounded by valuable timber tracts. By means of a lock and dam abundant water power is derived from the river and used for manufacturing purposes, the leading articles of manufacture being lumber, hemp, chairs, brooms, twine, shoes, flour, carriages, canned vegetables, glass bottles, etc. An extensive trade is maintained.

Situated upon a series of hills overlooking the river, the city is picturesque and healthful; and its beauty is enhanced by numerous fine buildings. The principal buildings include the capitol, erected at a cost of $2,000,000; the governor's mansion; the state arsenal; and those used for important institutions, such as the state penitentiary, the state home for feeble-minded children and the state normal school for negroes, the last just beyond the city limits. The state library here has over 100,000 volumes. Franklin cemetery, near the city, is a beautiful burying ground, in which are buried Daniel Boone, Theodore O'Hara, Richard M. Johnson (vice-president of the United States, 1837-1841), Joel T. Hart and others identified with the history of the state.

Frankfort was founded in 1786 by Gen. James Wilkinson, who made it a base of his commercial operations and intrigues with the Spanish at New Orleans. It became the capital of the state in 1792. Here in the autumn of 1862, while a force of Confederates under Gen. Braxton Bragg occupied the city, Richard J. Hawes was inaugurated governor. The city is administered under a charter of 1839. Population in 1920, U. S. Census, 9,805.

Frankfort-on-the-Main, a city of Prussia located on the river Main 24 m. above its juncture with the Rhine. Up to 1866 it was one of the four free cities of Germany, and it has always been an important financial and trading center as well as a popular residence city. The streets are broad and pleasant and lined with attractive buildings of both public and private character. Situated as it is near the region of the great medicinal springs, it attracts a large floating population.

Frankfort is one of the old Roman towns of Germany and was probably founded as early as the first century and contains many places of historic interest. The cathedral of red sandstone surmounted by a classic central tower 300 ft. in height contains the room in which the Roman emperors were elected, and the Leonhardskirche is situated upon the site of the palace of Charlemagne. This famous old church was begun in the year 1219 and was restored in 1882.

Other important and interesting buildings are: the Römer, or town hall, where the German kings were chosen and crowned; the Saalhof, the oldest building in the city; the Goethehaus, where Goethe spent the first 26 years of his life; the magnificent opera house completed in 1880; the Municipal Library, having a Gutenberg Bible and an illuminated manuscript Bible; and various educational institutions, as the Bethmann Museum, the Museum of Arts and Crafts, the Municipal Museum and the Städel Art Institute. The city has many beautiful groups of statuary, several of which were executed by Thorwaldsen. The industries are varied and consist of printing, brewing and the manufacturing of quinine, type, machinery, soap, perfume, etc. Population, 414,600.

Frank'ing, the sending of postal matter free of charge. Members of the British Parliament had this privilege up to 1840. In the United States, up to 1873, Revolutionary War soldiers, some government officials, senators and congressmen could frank mail matter. A few years later, the privilege was restored; and, though not infrequently abused, it has been continued in force because people like to receive, and congressmen, especially, like to send, official reports and public documents, which otherwise might not be generally distributed.

Frank'land", State of. Frankland, or Franklin, is a name given to a state organized in 1784 by the inhabitants of what is now Tennessee, in revolt from the control of North Carolina. A constitution was framed and ratified by popular vote, and a Legislature and governor elected. Civil war with the older parts of North Carolina seemed imminent, but after a somewhat bitter struggle the new government was suppressed in 1788. The Territory of Tennessee was known as the "Territory South of the Ohio" until June 1, 1796, when it was admitted into the Union. See TENNESSEE, subhead *History*.

Frank'lin, Benjamin (1706-1790), a famous American diplomat, statesman and philosopher, born at Boston, in a house opposite the Old South Church. His father, Josiah Franklin, was a native of Ecton in Northamptonshire, England, where his ancestors had lived for nearly four centuries. The family was strongly Protestant, and Josiah accompanied a small Puritan migration to America in 1685 to escape persecution. He settled in Boston, where he became a soap and candle maker. He was twice married and had in all 17 children, of whom Benjamin was the 15th.

EARLY LIFE. Since he was the tenth son, his father destined him for the ministry as a tithe of his sons. This did not suit Benjamin, however, neither was there money for the necessary education; and so he was taken from school at the age of ten to assist in his father's business by cutting wicks and filling candle molds.

The work was so distasteful to the lad that he thought of running away and going to sea, but his father apprenticed him at the age of 12 to his older brother James, who was a printer. He was a precocious boy, and had been able to read ever since he could remember. At an early age he had made himself familiar with *The Pilgrim's Progress, Robinson Crusoe, Plutarch's Lives,* Locke's *On the Human Understanding* and other standard works, and had practiced prose after the model of Addison's *Spectator*. In 1721 his brother started the *New England Courant,* one of the first newspapers established in America. Benjamin tried his hand at writing for this paper anonymously, and with much success. After his authorship became known, however, he fell into disfavor with the authorities for the independent character of his political and religious utterances. He also became dissatisfied with his brother's treatment of him, and he decided to leave home at the earliest opportunity.

A JOURNALIST. At the age of 17, by the sale of his books Franklin raised a little money and sailed for New York; from there he proceeded to Philadelphia. Here he arrived one Sunday morning,

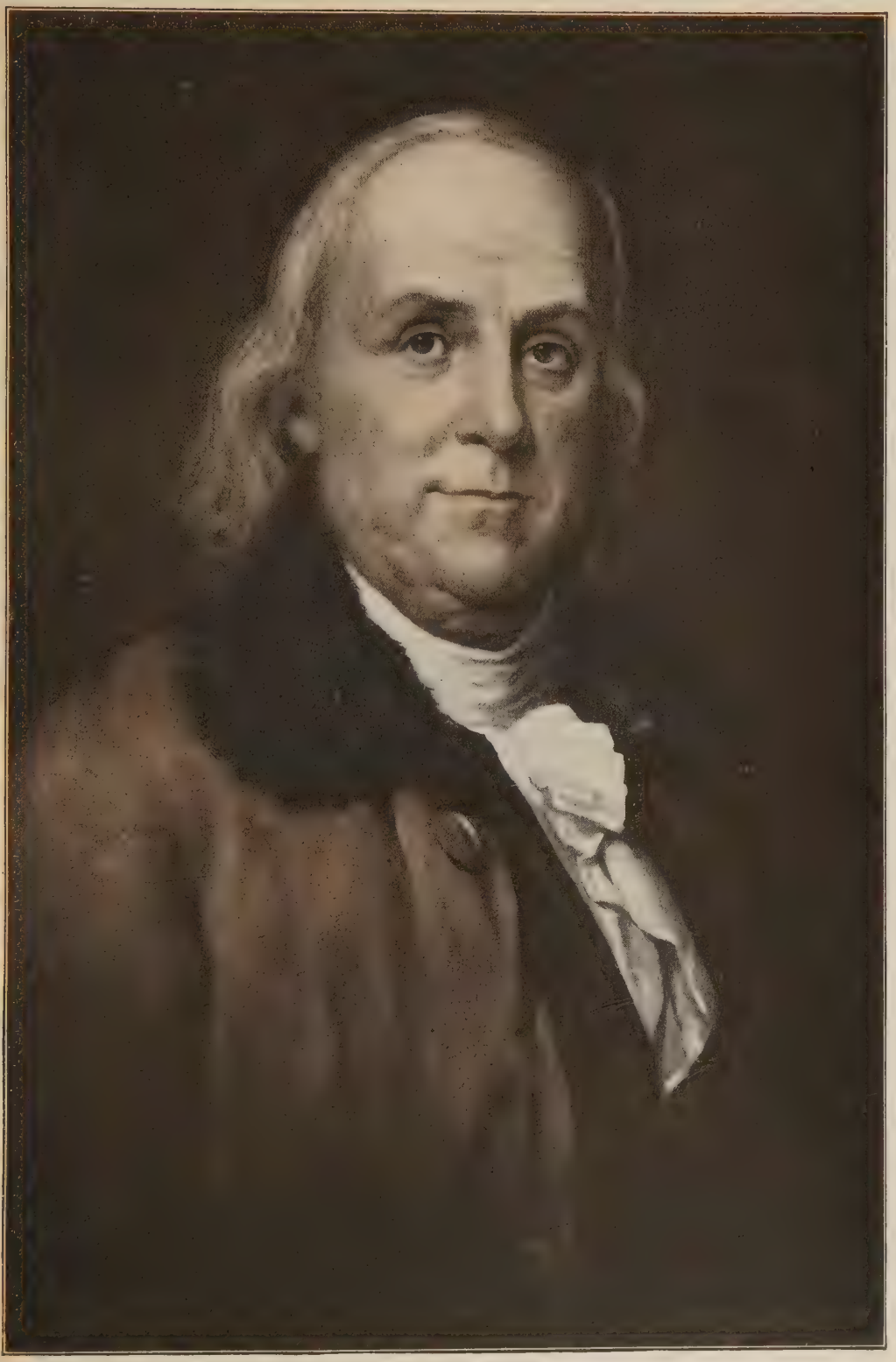
after various adventures by land and water, cold and friendless, with a single Dutch dollar in his pocket. His first meal was made from a loaf of dry bread which he munched as he walked along the street, much to the amusement of his future wife, then a young girl watching him from her father's doorway. But he had learned his trade thoroughly, and soon found employment in a printing office. His excellent workmanship and good sense early attracted the attention of Sir William Keith, governor of the colony, who offered him the government printing if he would set up in business for himself. Franklin went to London to buy presses and type, at the instance of Sir William, who promised to send him letters of credit for that purpose. The latter failed to keep his promise, however, and Franklin was forced to seek work in a printing office in London to meet his expenses. Here he remained for a year and a half, gaining much useful knowledge and making valuable acquaintances, and returned to Philadelphia in the autumn of 1726.

By 1730 he had become sole manager of a printing house, and soon became known as the most accurate, capable and reliable printer in the colony. The preceding year he had purchased the *Pennsylvania Gazette,* a weekly newspaper, which he at once converted into one of the ablest journals in America, and which he edited for more than 35 years. In 1732 he began the publication of *Poor Richard's Almanac,* a distinctive feature of which was its fund of homely proverbs and witty sayings. This *Almanac* he continued for 25 years. It reached an annual circulation of 10,000 copies, far exceeding that of any other publication in the colonies, and gave Franklin a wide reputation.

Through the columns of the *Gazette* and by the exercise of personal influence Franklin now entered heartily into the life of the colony and had a hand in most of the public enterprises and reforms of the day. The organization of the militia, of a police system, and of fire companies; the development of paving and street cleaning as municipal functions; the founding of the Philadelphia Library, one of the first, if not the first, in America, and of a city hospital; the establishment of the American Philosophical Society and of the University of Pennsylvania,—these were among the conspicuous enterprises in which he was leader.

Franklin early took a special interest in scientific investigations. During his life he also invented many useful devices, but refused to patent them for his own personal gain. By simple experiments with a key and a kite in a thunderstorm he proved the identity of lightning and electricity; and for this brilliant discovery he received the Copley medal from the Royal Society and the plaudits of the learned world. He invented the lightning rod; the Franklin open stove; a remedy for smoky chimneys; and improvements in the printing press, in ship rigging, in carriage wheels and in windmills.

Public Life. For more than half a century Franklin served the colonies in public office. In 1736 he was made clerk of the General Assembly of Pennsylvania. The following year he was appointed postmaster of Philadelphia, and in 1753 deputy postmaster-general for the colonies; and vastly increased the efficiency of the postal service. He became a conspicuous figure in intercolonial politics in 1754 by proposing at the Albany Congress (called by the royal governor to devise concerted action of the colonies in the approaching war with France) the first definite scheme for uniting the colonies in a permanent federal union—a plan of much political insight and practical merit (See Albany Conventions). In 1757 Franklin was sent to London by the Pennsylvania Assembly to urge its claims in favor of taxing the lands of the proprietors of the colony, the descendants of William Penn. Here he was most cordially received for his literary and scientific attainments, was given the freedom of the city of Edinburgh, was granted the degree of doctor of laws by the universi-



BENJAMIN FRANKLIN

FRANKLIN

ties of St. Andrew's and Oxford, and was made a member of the Royal Society of London. He formed the acquaintance of the foremost Englishmen of the day, successfully accomplished his special mission for Pennsylvania, emphasized as far as possible the rights of the colonies, and returned home in 1762.

Colonial Agent. This service was the first of many diplomatic missions which Franklin undertook in the interests of the colonies, work for which he was eminently fitted by his varied knowledge, his good sense and his great personal reputation abroad. In 1764 he was again sent to England by the Pennsylvania Assembly, in an effort to defeat the passage of the Stamp Act. While he did not succeed in doing this, he was instrumental in securing its repeal the following year. The colonies of Massachusetts, New Jersey and Georgia now united with Pennsylvania in making Franklin their agent in England. He used his great powers to prevent a separation between England and America, but was always independent and outspoken in his declaration of unwholesome truths. This led George III to call him "that crafty American who is more than a match for you all" (his ministers). When Franklin saw that war was inevitable, he returned to America in May, 1775.

Member of Congress. On the day after his arrival the Pennsylvania Assembly elected him to the Second Continental Congress, then about to assemble. He was a member of the committee of five chosen to draft the Declaration of Independence, of which he was one of the signers. It is related that as he dipped his pen in the ink he remarked, "We must indeed all hang together, or assuredly we shall all hang separately." A few months later Congress appointed him to go to Europe for the purpose of seeking foreign alliances for the new nation.

Mission to Europe. Upon his arrival in Paris he was greeted with a popular enthusiasm such as no other man of letters except Voltaire had ever received. He was now one of the best-known men in the world; three editions of his scientific writings had already been published in Paris, he was a member of the French Royal Academy and of every important learned society in Europe, and he was the embodiment of the American spirit of liberty for which all France also was yearning. Franklin's services in France cannot be overestimated. Through his efforts large sums of money were loaned or given to the American Government (amounting to about $60,000,000), without which it is difficult to see how the war could have been carried to completion; arms and ammunition were sent over; and on Feb. 6, 1778, the Treaty of Alliance was signed at Paris which secured the active cooperation of France that made ultimate success possible.

Preliminary steps looking to a peace treaty with England were taken by Franklin immediately after the fall of Lord North's ministry in 1782; and he had the great satisfaction of seeing these bear fruit in the remarkably favorable treaty with the Mother Country, signed in Paris the following year, secured by his efforts and those of his colleagues, John Adams and John Jay, one of the most brilliant triumphs in modern diplomacy (See PARIS, TREATIES OF). After negotiating a satisfactory treaty with Prussia, Franklin was permitted to return to America in September, 1785, in response to repeated requests to be relieved. The month after his return, although now in his 80th year, he was elected president of Pennsylvania, a position corresponding to the present governorship, and served in that capacity for three years.

Constitutional Convention. One more national task awaited him. When the immortal convention met in 1787 that formed the Federal Constitution, the gathering would have been incomplete without the presence of the venerable "sage of America." His was the only signature attached to all four of the great documents that marked our nation's birth: the Declaration of Independence, the Treaty of Alliance with France, the

Treaty of Peace with England, and the Constitution of the United States. The last public act of Franklin was a fitting conclusion of his long life of usefulness —the signing of a memorial to Congress, as president of the Abolition Society, petitioning for the abolition of slavery. A few months later, weighted with years and with honors, his long life came to an end.

ESTIMATE OF HIS CHARACTER. "No Englishman of his generation can now be said to have established a more enduring fame, in any way, than Franklin established in many ways. As a printer, as a journalist, as a diplomat, as a statesman, as a philosopher, he was easily first among his peers." His unusual literary ability, best represented by his remarkable *Autobiography,* his scientific and philosophical acumen, his broad mental grasp of critical situations, his charming wit and humor, his devoted patriotism, his ardent love and service of humanity,—all of these are tokens of the greatness and richness of that unique personality whose name has become a household word in American homes.

Franklin, Sir John (1786-1847), an Arctic explorer, born in Lincolnshire, England. When he was 14 he became a midshipman in the navy; was in the Battle of Copenhagen, 1801; went with Captain Flinders to the coast of Australia in 1801-1803; and had charge of the signals on the *Bellerophon* in the Battle of Trafalgar, 1805. In 1819 Franklin set out on an expedition to the Arctic Sea by way of Hudson Bay. He was absent about three years, having surveyed the mouth of the Coppermine River and the shores of Coronation Gulf, making careful observations that have been of great value. In 1822 Franklin was made port captain and a fellow of the Royal Society. For subsequent discoveries in the Far North he was knighted by his sovereign, received the degree of D. C. L. from Oxford, the gold medal of the French Geographical Society and was made a member of the Institute of France. In 1845 Franklin went forth on his last expedition, seeking the Northwest Passage, from which he did not return. About 20 expeditions were sent out at different times to search for him, and in 1859 a document was found which gave the latest details of the expedition. This paper disclosed that Franklin had died in 1847, and that the ships were abandoned in 1848. Many relics of the party have been recovered.

Franklin, Pa., county seat of Venango Co., 9 m. s.w. of Oil City and 125 m. n.e. of Pittsburgh, on the Allegheny River, at the mouth of French Creek, and on the Pennsylvania, the Erie and the Lake Shore & Michigan Southern railroads. The growth of the city has been largely determined by its position as the center of the chief oil region of the state. Natural gas is also abundant. The city occupies the site of the French Ft. Venango, built in 1753. The chief interest of Franklin is oil, but it has also flour mills, machine shops, brickworks and manufactories of steel castings, oil-well supplies, tools and other articles. It was settled about 1753 and incorporated in 1795. Population in 1920, U. S. Census, 9,970.

Franklin, Battle of, an engagement of the Civil War, fought Nov. 30, 1864, at Franklin, Tenn., between some 25,000 Federals, under General Schofield, and about 40,000 Confederates, under General Hood. Hood had hoped to divert Sherman from his march through Georgia by advancing into Tennessee and attacking Thomas at Nashville. Schofield, however, had been sent to hinder the Confederates, and retreating before them to Franklin, made a stand in a bend of the Big Harpeth River. After several desperate assaults by the Confederates, which continued till midnight, Schofield was not dislodged from his position. Nevertheless he withdrew, and soon joined Thomas. This was one of the most sanguinary battles of the Civil War, the loss in generals far exceeding that of any other engagement. The Confederates' loss, all told, was about 6000; the Federals', about 2300.

Franks, a fusion of Teutonic tribes which from about the year 250 dwelt

on the Middle and Lower Rhine. Although before that time the name Franks had not been applied to them, the various tribes from which the new nationality was formed were known separately to the Romans much earlier. Later the Franks upon the Lower Rhine were called the Salian Franks and those on the Middle Rhine were called the Riparian Franks, or Riparii. The Franks first became powerful under Clovis (486), a leader of the Salian Franks who overthrew the Roman governor in Gaul and later took the Valley of the Seine and conquered the Alemanni (496). After this victory he became an orthodox Christian and received the favor of the Roman Church. After the death of Clovis the kingdom was divided among his sons, but one stronger than the rest, succeeded in holding together his father's possessions. Gradually the Salian Franks conquered or absorbed all other Frankish tribes and occupied all of central and western Europe. Some of the most powerful of the Frankish kings after Clovis were Pippin of Heristal, Charles Martel and Charles the Great, or Charlemagne. After the death of Charlemagne the Frankish Kingdom was divided and never again became united. Its place in later history was taken by the German, French and Italian nations.

The Franks are described as a stalwart warrior race, fierce in aspect, huge in limb, with blue eyes and long, flowing hair. In time of peace they led an agricultural life but ordinarily they were given up to the pursuit of war. They met in council once a year, where, fully armed, they discussed and voted upon important public questions.

Because of their ability to absorb the culture of the Romans and pass it on to the countries of the North, the Franks were a strong influence in the building of the European nations. They were the civilizers of the German people, and their laws, which provided for the rights of subjects as well as for the power of the sovereigns, were the basis of European law. Of great importance, too, was the close connection established between the Frankish people and the Church, a connection which later had vital influence upon the development of Europe.

Fraser, *Fra' zer,* **River,** the most important river of British Columbia, flowing through the central and southern part of the province. The river rises in the western slopes of the Rocky Mountains and flows in a northwesterly direction until it finds its way through the Caribou Mountains and flows southwest into the Straits of Georgia. The current of the river is rapid, and the many large tributaries sweeping down their rocky courses add to its force and swiftness. The chief of these are the Chilcotin, Thompson and Quesnel. The Fraser flows through many large lakes and through canyons of great depth and beauty. Above the city of Quesnel in a great bend of the river there are rich deposits of gold. New Westminster, Yale and Lytton are the chief cities on its shores. The steamers which navigate the Fraser are small but fitted with powerful engines.

Fraud, in law, all practices which have for their object the defrauding of another of his property or rights, through deceit. Most frauds are recognized in common law and are punishable in law courts. Those not amenable to common law are recognized in courts of equity. In each case the perpetrator of the fraud is punishable according to the laws of the state in which the act was done. Selling unwholesome foods and using short weights and measures are classed as public frauds, which, in most states, are severely punished.

Fraunhofer, *Froun' ho fer,* **Lines.** See SPECTRUM ANALYSIS.

Fréchette, *Fra"shet',* **Louis Honoré** (1839-1908), a French-Canadian poet, born at Point Levi, Quebec. After studying at Quebec Seminary and Laval University he was called to the bar in 1864. He took up newspaper work in Chicago for some time, and in 1874 was elected to represent his native town in the Dominion Parliament. In 1879 he returned

to journalism and edited French papers in Quebec, Montreal and Chicago. For a long time he was an ardent advocate of the political union of Canada and the United States. He was made a knight of the Legion of Honor, was honored by the French Academy and the Imperial Institute, London, and served as president of the Royal Society of Canada and of the Canadian Society of Arts. He was generally known as the "Canadian laureate," being the representative poet of French Canada. He translated Howell's *Chance Acquaintance* and Cable's *Creole Days,* and wrote *Veronica, Christmas in French Canada, My Leisure Hours, The Legend of a People, Pell-Mell, The Voice of an Exile, Papineau* and *Felix Poutré.*

Frederick II, also named the Great (1712-1786), King of Prussia and successor of his father, Frederick William I. At the age of 18 Frederick tried to escape to Great Britain. The plan was discovered and but for the intervention of the Emperor, the youth would have been executed by his father, who considered his son guilty of treason. He was confined at Cüstrin Castle for a while, and a little later he began his rigid discipline in the Prussian army.

He succeeded his father, Frederick William I, in 1740. When Maria Theresa became Empress of Austria, Frederick used an obsolete Prussian claim to Silesia as a pretext to invade the province. Then ensued the War of the Austrian Succession. He was successful, and by the Treaty of Breslau in June, 1742, Maria Theresa was obliged to give up nearly all Silesia to Prussia. The war with Austria was renewed two years later, and when it closed, in 1748, by the Treaty of Aix-la-Chapelle, Frederick had the reputation of being one of the greatest generals of his day.

Peace continued for eight years, but Austria was unresigned to her loss and at last found allies in France, Sweden and Russia. When Frederick found that war was inevitable, he invaded Saxony, and thus began the struggle known as the Seven Years' War, involving both the European powers and their colonies. He thought of suicide more than once, as he realized the danger into which he had plunged Prussia. In the darkest hour he was saved by the death of his relentless foe, Elizabeth of Russia, and by the exhaustion of France. By the Treaty of Hubertsburg in 1763, Frederick came out of the fearful struggle still holding Silesia. It was his resourcefulness during this struggle that won him his title of the Great.

Frederick now turned his attention to the development of the resources of his country. In 1772, by the partition of Poland, he shrewdly managed to acquire West Prussia. He prevented Joseph II, a little later, from adding Bavaria to Austria. In his foreign policy Frederick followed expediency as a rule. In his domestic policy, however, he placed the interest of his people first. He constructed canals and roads, drained marshes and encouraged manufactures and agriculture. Moreover, he called to his court the greatest writers, scientists and philosophers of the time. By his masterful reign Prussia was made the equal of Austria. With Prussia as a center, a union of German states, which constituted the beginning of the present German Empire, was formed.

Frederick II (1194-1250), the son of Henry VI and Constance of Sicily. He was the King of Sicily from 1197 until his death, but was under the guardianship of Pope Innocent III until 1208. He began an attempt to secure the throne of Germany from Otho IV in 1212, and, with the aid of the Pope, he was crowned at Aix-la-Chapelle in 1215. At his coronation he took a vow to go on a crusade, which, when he was finally able to undertake it, resulted in the Sultan's giving up Jerusalem and in Frederick's coronation as King of Jerusalem. Frederick was an able sovereign, building up his Italian dominions, encouraging learning and advocating political reforms. His interest in his Southern possessions, however, involved him in costly wars for their sake, and led him to be neglectful of the welfare of his German subjects.

Frederick VIII (1843-1912), King of Denmark, son and successor of Christian IX. He succeeded to the throne in 1906. His short reign was uneventful, but he endeared himself to his subjects because of his active interest in public questions and his kindly disposition and democratic manner. A man of wide cultivation, he was associated with many learned organizations, and was at one time chancellor of Copenhagen University. His second son, Charles, in 1905 became King of Norway as Haakon VII. Frederick was succeeded by his eldest son, Christian X.

Frederick, Md., a city and the county seat of Frederick Co., 60 m. n.w. of Baltimore, on Carroll's Creek and on the Baltimore & Ohio, the Pennsylvania and other railroads. It is situated in a picturesque and fertile valley and has a number of important industries. The industrial establishments include canning plants, planing mills and brickworks and manufactories of hosiery, leather, shoes, shirt waists, fiber brushes, coaches, tobacco, flour and shutter fasteners. At Frederick is located a state institution for the education of the deaf and dumb, and Women's College (Reformed Church), founded in 1893. Other institutions are Frederick College, St. John's Literary Institute and the Frederick City and Emergency hospitals. In the vicinity are the famous battlefields of Monocacy and South Mountain. Frederick has been made famous as the scene of Whittier's poem, *Barbara Frietchie.* In Mt. Olivet cemetery, near the city, Francis Scott Key, author of *The Star Spangled Banner,* lies buried, and a worthy monument to his memory stands at the entrance to the burying ground. Roger B. Taney also is buried here in the graveyard of the Roman Catholic Church. Washington met Braddock here in 1755 to plan the expedition against the French. Settled in 1745, Frederick was incorporated in 1817. Population in 1920, U. S. Census, 11,066.

Frederick Bar"baros'sa (1123-1190), Holy Roman emperor and first of the Hohenstaufen dynasty. He succeeded Conrad III as King of Germany in 1152, and was crowned emperor by Pope Adrian IV in 1155. The northern cities of Italy rebelled against him, but he reduced Milan in 1162 and took Rome five years later. In 1174 he was again free to attend to Italian affairs. The Lombard League had grown strong in the meantime and it won a complete victory over him at the Battle of Legnano, in 1176, and forced him to give up control over the cities of Italy. He was also forced to seek conciliation with Pope Alexander III, as he was pressed at home by the Guelph family. He returned and banished Henry of Saxony and confiscated his lands. A few years later he married his son Henry to Constance, heiress of the Kingdom of Sicily. It was through this union that Sicily became a part of the German Empire. By this time Frederick had regained some power and influence in Italy, on account of disunion in the Lombard League. He started at the head of the Third Crusade, but was drowned before reaching Palestine.

Frederick Barbarossa won the affection of his German subjects and his memory still lives in the songs and legends of his country. Around his name clustered for centuries the aspirations for the long-deferred national unity.

Fredericksburg, Battle of, an important engagement of the Civil War, fought between 116,000 Federals, under Burnside, supported by Sumner, Hooker and Franklin, and 80,000 Confederates, under Lee, aided by Jackson and Longstreet, Dec. 13, 1862. After his retreat from the North, Lee stationed himself in the high bluffs overlooking Fredericksburg and on the south side of the Rappahannock River, which, by Dec. 12, the Federals had crossed over from Falmouth. The following day Burnside recklessly threw his army against the stronghold of Lee's position, on Marye's Heights, withdrawing after six ineffectual assaults, with a loss of 12,500 men to the Confederates' 5400. In consequence of this defeat Burnside was relieved of command of the Army of the Potomac. See CIVIL WAR IN AMERICA.

Fred'ericton, a city of Canada, port of entry of New Brunswick and capital of the province, situated on the St. John River, 84 m. from its mouth. It is regularly built and has many handsome public edifices, including the government house, the Parliament Buildings, the Anglican Cathedral and the provincial university. There is a large trade in lumber; other industries include tanning, canning and the manufacture of machinery and woodenware. The city was founded by Sir Guy Carleton in 1785. Population in 1911, 7208.

Frederick William (1620-1688), Elector of Brandenburg, generally known as the Great Elector. When he succeeded his father at the age of 20, his territory had suffered severely from the Thirty Years' War. His vigorous policy soon filled the treasury and made it possible to strengthen the means of defense of his country. In 1675 he won a decisive victory over the Swedes at Fehrbellin. He left his country larger and far more prosperous than he had found it, and is considered as second only to Frederick the Great in establishing the power of Prussia.

Freedmen's Bureau, a bureau of the United States Department of War, established by act of Congress, March 3, 1865, to meet special needs, as Congress faced the gigantic problem of caring for the colored people, whose liberation from slavery had thrown them on the country without the means of self-support. The title was "Bureau of Refugees, Freedmen and Abandoned Lands," and the bureau was given power to assign small tracts of land of not more than 40 acres to each deserving refugee. The original law provided that the bureau continue one year after the war, as a trial of the system. In 1866 and 1868 additional bills were passed extending the powers and term of the bureau, which ended its main work in 1869. Its educational work lasted until 1872, and bounty payments continued some years longer. During the years that the work continued over $20,000,000 was expended.

Free Lances, companies of roving knights and men-at-arms who engaged in plunder or sold their services. These bands were prominent during the Middle Ages, particularly in Italy and France. In Italy, where they were known as the *Condottieri,* they developed from the feudal wars. In France, where they were called *Compagnies Grandes,* they were brought out by the long and terrible wars between that country and England. These free lances of France were exceedingly dangerous to the country, and were finally persuaded to sell their services to Spain; thus France was freed from their depredations.

Free'man, politically, one who has inherited the full rights and privileges of citizenship. The term is of ancient origin. Among the Romans it included all classes who were not slaves. From the time of the Romans the distinction continued through the Middle Ages, and it was also recognized from time immemorial among the Germanic nations. Among these nations the privileges of the freeman were based on ownership of land; thus in England the freeman was strictly a freeholder.

The term *freedman* is usually applied to those who have been liberated from bondage but do not share full political rights with the freeman.

Freeman, Edward Augustus (1823-1892), an English historian, born at Harborne, Staffordshire, England. He was educated at Oxford College and became a fellow in 1845. During 1881-2 he traveled in the United States, chronicling his views of the nation in his book *Some Impressions of the United States.* In 1883 he was called to the regius professorship of modern history at Oxford. Freeman was the leader of the Teutonic School of English history, and wrote voluminously, not only on historical but also on antiquarian and topographical subjects, architecture and politics. *The History of the Norman Conquest* is his most important work.

Freeman, Mary Eleanor Wilkins (1862-), an American story-writer, born in Randolph, Mass., and educated there and at Mt. Holyoke Seminary.

She was married to Dr. Charles M. Freeman in 1902. At an early age she began to contribute short stories and poems to magazines, later becoming widely known for her stories and novels descriptive of New England life and character. The charm of her work lies in her faithful and vivid power of portrayal. The most important of her writings include *Young Lucretia, A New England Nun, The Love of Parson Lord, Jane Field, Pembroke, The Portion of Labor, By the Light of the Soul, The Jamesons, and People of Our Neighborhood* and *The Poor Lady.*

Free Masons, a secret society originating in the Middle Ages. The present system of Freemasonry dates back to 1717, when the Mother Grand Lodge was inaugurated in London. The first lodge was opened in the United States in Boston, Mass., 1733. In 1919 the membership in the various lodges throughout the United States was over 2,000,000. Charity, brotherly love and mutual assistance are the principles on which the order is founded.

Free'port", Ill., a city and county seat of Stephenson Co., 120 m. n.w. of Chicago, on the Pecatonica River and on the Illinois Central, the Chicago, Milwaukee & St. Paul, the Chicago & North Western and other railroads. It manufactures hardware, windmills, pumps, carriages, spring wagons, paints, leather, gasoline engines and novelties, and contains railroad shops. The city has a public library. Freeport was settled in 1835 and chartered as a city in 1885. It was here that Douglas in one of his debates with Lincoln enunciated his famous slavery doctrine known as the "Freeport heresy," which held, in spite of the Dred Scott Decision, that the citizens of a territory possessed the right to decide through its representatives whether or not slavery should be allowed in that territory. Population in 1920, U. S. Census, 19,969.

Free-Soil Party. See POLITICAL PARTIES IN THE UNITED STATES, subhead *Free-Soil Party.*

Free Trade. See TARIFF.

Freez'ing Mix'ture. See COLD STORAGE.

Fremont', John Charles (1813-1890), an American soldier and explorer, born in Savannah, Ga., and educated at Charleston College. From 1833 to 1835 he was instructor of mathematics in the United States navy, and in 1837 he entered upon a survey of the Cherokee country, thus beginning his famous explorations. He explored the region from the Missouri River to the British possessions and later, as second lieutenant of topographical engineers, mapped out an overland route to the Pacific. He ascended, while thus engaged, what was afterwards called Fremont's Peak, explored the Great Salt Lake region and penetrated to the mouth of the Columbia River. In 1845 he led another government expedition to the Rocky Mountain region, and the following year became involved with the Mexican authorities on the Pacific coast., Shortly afterwards he assisted in the conquest of California, becoming its commander and civil governor. When, toward the close of 1846, General Kearny reached California, Fremont refused to recognize his authority and was thereupon court-martialed, convicted and sentenced to dismissal. Though this penalty was remitted by President Polk, Fremont resigned from the service. Subsequently he led another exploring expedition over the Rockies, and, upon the admission of California, became its first United States senator. At his own expense he made his fifth and last exploration in 1853. For his scientific researches he had been honored by the King of Prussia and by the Royal Geographical Society of London, and had become popularly known as "the Pathfinder."

In 1856 Fremont was presidential candidate of the newly-formed Republican Party, but received only 114 electoral votes to the 174 given for Buchanan. Returning from Europe in May, 1861, he was appointed major-general, with command of the Western Department; but in the course of six months he was removed because of an

ill-advised order of confiscation. Later he commanded another department, but in 1862 he resigned, as he refused to serve under an officer of inferior rank. In 1864 he was candidate for president for the Radical Republicans, but withdrew his name before the election. Following the war he was interested in constructing a transcontinental railway, and from 1878 to 1882 he was governor of Arizona. See Fremont's *Memoirs of My Life.*

Fremont, Neb., a city and the county seat of Dodge Co., 46 m. n.w. of Omaha, about 2 m. distant from the Platte River, on the Union Pacific, the Chicago, Burlington & Quincy, the Chicago & North Western and other railroads. Fremont is surrounded by rich farm lands and has an extensive wholesale grain trade and dairy and live-stock interests of importance. There are numerous industrial plants, including flour mills, canning factories, machine shops, planing mills and manufactories of saddlery, carriages, furniture and incubators. Fremont is attractively situated amidst the picturesque scenery of the Platte River, which is lined with high bluffs and dotted with wooded islands. The city is the seat of Fremont College; of the Commercial Institute and School of Pharmacy, a private institution, founded in 1875; and has a public library. Founded in 1856, Fremont became the county seat in 1860, in 1871 receiving its charter as a city. Population in 1920, 9,605.

Fremont, Ohio, a city and county seat of Sandusky Co., 30 m. s.e. of Toledo, on the Sandusky River and on the Lake Shore & Michigan Southern and the Lake Erie & Western and other railroads. Sandusky county is a rich agricultural section of Ohio, its location near the lake makes it possible to raise fruits more successfully than in some sections of the state. To its advantageous situation, we must add that Fremont is situated in an agricultural region and is a busy industrial center, having manufactories of cutlery, agricultural implements, cigars, engines, boilers, electrocarbons, carriages and carriage hardware. The Birchard Public Library, founded by an uncle of Ex-President Hayes, is located here. There are also normal and business schools. Fremont occupies the site of a trading post established in 1785. In 1850 its former name was changed from Lower Sandusky to Fremont in honor of J. C. Fremont. Population in 1920, U. S. Census, 12,468.

French, Alice (1850-), an American novelist, better known as Octave Thanet, born in Andover, Mass. She published articles on economics and social science in 1878, and after her removal to Arkansas and Iowa began to write short stories. The new scenes and interests furnished her with fresh themes for literature which attracted attention because of their very novelty. She has written *The Bishop's Vagabond, Whitsun Harp, Knitters in the Sun, Otto the Knight, A Book of True Lovers, Stories of a Western Town, Expiation, We All* and *The Man of the Hour.* She also edited *The Best Letters of Mary Wortley Montague.*

French, Daniel Chester (1850-1912), one of the foremost American sculptors, born at Exeter, N. H., the son of a judge in the New Hampshire courts. He studied at the Massachusetts Institute of Technology, with J. Q. A. Ward and with Thomas Ball at Florence, Italy. Returning to America he opened a studio and worked in Washington, Boston and Concord, finally settling in New York. He is a versatile genius, and his output, including portraits, ideal figures and reliefs, is considerable. Busts of Emerson and Alcott; the marble statue of Lewis Cass, in the Rotunda of the Capitol, Washington; the monument to John Boyle O'Reilly, Boston; *The Minute Man,* made for the town of Concord, Mass.; the *Hunt Memorial,* Central Park, New York; *Alma Mater,* for Columbia University; the statues *History* and *Herodotus* for the Congressional Library, Washington; the bas-relief memorial, entitled *Death and the Sculptor,* are among his noteworthy productions. He designed the fine bronze doors of the Boston Public Library; and, among other

pieces of decorative statuary for the Columbian Exposition, Chicago, the colossal gilded figure of the *Republic*. His brother, W. M. R. French, was director of the Art Institute, Chicago.

French and Indian Wars, a name given to a series of wars between the French and the English in America in the 17th and 18th centuries.

King William's War, 1689-1697, was the American movement in the European War of the Palatinate. The conflict opened with French expeditions under Governor Frontenac of Canada, who sent forces composed mostly of Indians, to raid the border towns of New York and New England. In retaliation the English colonists sent out two expeditions, one overland against Montreal and one by way of the sea against Quebec. Sir William Phipps, commander of the fleet, made a temporary capture of Port Royal, Acadia. Otherwise the expeditions were failures. The Treaty of Ryswick made mutual restoration of all conquests in America.

Queen Anne's War, 1702-1713, was the American action of the European War of the Spanish Succession. It opened in the South, when an attack from South Carolina against Spanish settlements in Florida brought on a countercharge upon Charleston. In the North there were the usual French and Indian raids upon New England towns. In Massachusetts, the town of Deerfield, in 1704, and Haverhill, in 1708, suffered especially. The English sent three expeditions to capture Port Royal, Acadia, the last of which, 1710, was successful. A subsequent attempt to capture Canada, by taking Montreal and Quebec, proved a humiliating failure. The Peace of Utrecht, April, 1713, gave to England the Hudson Bay region, Acadia and Newfoundland. Moreover, by it the Iroquois were recognized as British subjects.

King George's War, 1744-1748, consisted of the American operations in the War of the Austrian Succession. The early movements were French incursions against English settlements in New England and Newfoundland; but the event of the war was the capture of Louisburg, Cape Breton Island, in 1745. This was the strongest coast fortress in America; it took 25 years to build it and it had cost $6,000,000. The expedition against Louisburg was conducted by a force of 4500 under William Pepperell, a merchant from Maine. The Treaty of Aix-la-Chapelle, October, 1748, restored Louisburg, despite the indignation of New England, and all other conquered territory.

French and Indian War. The last of the four wars, 1754-1763, was an American phase of the Seven Years' War waged by England and France. The Treaty of Aix-la-Chapelle had been just a truce, and the committee which had been appointed to settle the boundary dispute in America had accomplished nothing after three years of deliberation. Trouble on the border line between Nova Scotia and Maine early became serious, and after 1748, the great Western movement brought French and English jurisdiction into conflict. Each country was anxious to secure the territory at the head of the Ohio River. The French, through Céloron, took formal possession of it in 1749, and when the Ohio Company proposed peopling its royal grant of 500,000 acres there with Englishmen, the French began to erect forts. One at Presque Isle (Erie, Pa.) was erected in 1753, as were Ft. LeBœuf and Ft. Venango on branches of the Allegheny River. Governor Dinwiddie of Virginia, through Washington, ordered the French to vacate their posts. They refused. In May, 1754, a skirmish occurred while Washington was attempting to build a fort at the junction of the Allegheny and Monongahela rivers. This "cannon shot fired in the woods of America was the signal that set Europe in a blaze." Hostilities had commenced. Later Washington built, but had to surrender, Ft. Necessity. The next year, an English expedition under Braddock attempted to retrieve this disaster by attacking Ft. Duquesne (Pittsburgh). This force was surprised in ambush and

routed with great loss (See BRADDOCK, EDWARD).

The same year the British Government exiled about 7000 Acadians, whose loyalty to the Crown was suspected. Expeditions subsequently made against Canada, by way of Lake Champlain and Ft. Niagara, were failures, and the English were nearly despondent when, in 1758, through the efforts of the elder William Pitt, new life was put into their waning cause. That year generals Amherst and Wolfe captured Louisburg; and Ft. Frontenac, on the western shore of Lake Ontario, and Ft. Duquesne were also taken. Ticonderoga, Crown Point and Niagara fell to the English the following summer. The crowning event of the war was the capture, September, 1759, of the almost invincible Quebec by an English force under General Wolfe (See WOLFE, JAMES; MONTCALM, LOUIS JOSEPH; QUEBEC). This practically ended the war, though skirmishes were kept up, and in the spring of 1760, the French made a desperate though unsuccessful attempt to regain Quebec.

The Treaty of Paris, February, 1763, stipulated that France give to England all its territory east of the Mississippi, including Canada, Newfoundland and Cape Breton Island; to Spain it gave Louisiana and all possessions west of the Mississippi together with the Isle of Orleans. Spain gave England Florida, in exchange for Havana. Thus French power in North America was annihilated, and Spain alone was a rival of England in the New World.

French Broad River, a picturesque river rising in the Blue Ridge Mountains in North Carolina and flowing east into the Holston, a few miles above Knoxville. Through the Smoky Mountains the scenery along the river is especially beautiful, for the deep mountain gorges are cut in cliffs whose walls are from 200 ft. to 300 ft. in height. The river is 250 m. long, but is not of especial value for navigation.

French Congo. See FRENCH EQUATORIAL AFRICA.

French Equatorial Africa, formerly known as the French Congo, a French possession upon the coast of West Africa. It lies between Kamerun and Congo State and is made up of three colonies, Gabun, Middle Congo and Ubangi-Shari-Chad. In 1910, when its new name was given it, its boundaries were accurately defined. The country is traversed by mountains, which run parallel to the coast and are covered with great forests. The rivers are large and are mostly tributary to the Congo. Libreville, the capital, has one of the finest harbors of Africa. Other important cities are Loango, Franceville and Brazzaville. Coffee, cocoa, vanilla, rubber, palm oil and kola nuts are largely produced and exported. Gold, copper and iron are mined. The population is estimated at 1,498,000.

French Guinea, *Gin' y,* a colony of French West Africa, lying between Portuguese Guinea and Sierra Leone and having about 175 m. of coast upon the Atlantic Ocean. The country is very fertile and has many rivers intersecting it. India rubber is the chief product, but bamboo, sesamum, kola nuts, coffee, palm oil, rice, millet and fruits are also abundantly produced. The area of French Guinea is about 98,000 sq. m. Konakry, the capital, is its largest port. The administrative affairs are under charge of a lieutenant-governor, subordinate to the governor-general of French West Africa. Its population is estimated at 1,498,000.

French Indo-China, the collective name applied to the French possessions in southeastern Asia. It includes Cochin China, Tonkin, Annam, Cambodia and Laos. Hanoi, the capital, lies in Tonkin and is the official residence of the governor-general, who is appointed by the French Government. The agricultural products consist of rice, corn, pepper, silk, cotton, tea, sugar, rubber and tobacco; coal, lignite, zinc, antimony, tin, tungsten and gold are mined. Kwang-chauwan, on the coast of China, was made a dependency of French Indo-China in 1900, and its governor is subject to the governor-general. The area of

French Indo-China is 310,000 sq. m.; its population is 16,315,000.

French Language. See LANGUAGE, subhead *Modern Romance Languages.*

French Revolution, the great social and political upheaval in France during the last decade of the 18th century. It is usually regarded as covering the period from the meeting of the States-General in 1789 to the establishment of the Consulate in 1799. The primary cause of the Revolution was the survival of medieval ideas and practices in the midst of modern conditions; and its chief result was the overthrow of these remnants of an outgrown civilization and the inauguration of a new social epoch in France. When the Revolution began there were two privileged classes in France, the nobility and the clergy. Together they numbered about a quarter of a million, out of a population of over 25,000,000; but they owned half of the land and enjoyed practically all of the special privileges and immunities. The burden of taxation fell almost wholly upon the peasant class. Taine has estimated that four-fifths of the fruits of the peasants' labors were taken by the government. Under the old regime the administration of government was arbitrary, antiquated and cumbersome, both at the court and in the provinces. The growing discontent was fanned by a brilliant company of critics, including such men as Montesquieu, Voltaire and Rousseau, who satirically arraigned existing conditions.

The luxurious extravagance of the French court could not be maintained upon the taxes wrung from the peasantry, and the imminent bankruptcy of the nation brought matters to a crisis and forced Louis XVI to convene the States-General, which had not met since 1614. When this body assembled at Versailles in 1789, the Third Estate, constituting half of the representatives, rejected the old custom of having the social orders meet and vote separately, claiming that this would effectively block reform. They insisted upon joint sessions and majority decisions. When the others demurred, they declared themselves to be the National Assembly. The King finally yielded, and at his bidding the two upper orders—nobility and clergy—joined with them in organizing the Constituent Assembly.

When the King dismissed Necker, the popular minister of finance, and concentrated troops on Paris, an immense crowd on July 14 stormed the Bastille, the national prison and symbol of generations of tyranny, and brought on the tragic scenes of the Revolution. The Constituent Assembly abolished the old feudal privileges, adopted the Declaration of the Rights of Man, and organized the National Guards. The nobles who were unwilling to accept the situation left France, and became known as the Émigrés. In October a mob marched to Versailles, killed the royal guards and compelled the King and Queen to return to Paris and take up their residence in the Tuileries.

The Constituent Assembly also removed to Paris, where it decreed the transfer of the property of the Church to the State, suppressed all titles of nobility and completed the constitution. This was signed by the King on July 14, 1790, although his oath of acceptance was regarded with suspicion,—a suspicion that was increased by the attempt of the King and Queen on the night of June 20, 1791, to escape from France to the protection of the Queen's brother, Emperor Leopold II of Austria. They were captured and brought back to Paris. A revised constitution was adopted, to which the King took oath in September, 1791. The Constituent Assembly then dissolved, and was succeeded on Oct. 1 by the Legislative Assembly. The retirement of Necker and the death of Mirabeau having left France without experienced statesmen, new leaders came forward in the Legislative Assembly. The delegates divided into two groups, the Girondists, who were moderate republicans, and the Mountain (so called because they occupied high seats in the hall), the party of more radical reform.

And now, at a time when France greatly needed peace in order to adjust

her internal affairs, complications had arisen with Prussia and Austria through the efforts of the Queen and Émigrés to enlist these nations in the defense of the royal family; and war was declared on Apr. 20, 1792. Early defeats of the French forces caused outbreaks of the Paris mobs. On Aug. 10 the Tuileries was stormed, and the King threw himself upon the mercy of the Legislative Assembly, which suspended him and imprisoned the royal family in the Temple. Further military defeats led to the massacres of September, in which 1000 Royalists were slain by the mob. The tide of disorder was temporarily stayed by the French victory in the Battle of Valmy.

The National Convention, elected by universal suffrage under a new constitution adopted after the imprisonment of the King, succeeded the Legislative Assembly on Sept. 21, 1792. It showed its radical character by promptly abolishing the monarchy and declaring a republic. In December the King was brought to trial on a charge of treason, convicted, and beheaded on Jan. 21, 1793. The division of parties in the Convention now became bitter. The Girondists, as the party of moderation, had voted reluctantly for the death of the King, and could not cope with the situation. The King's execution had united the nations of Europe against the Revolution. Hostile armies were pressing toward Paris. Within was anarchy. Bold measures became necessary, and the Girondists were overthrown by the fierce champions of democracy. Before the end of the year their leaders were put to death, leaving the Jacobins of the Mountain Party in complete control.

The court known as the Revolutionary Tribunal was established in March, 1793, for the trial of persons charged with crimes against the nation. In April the Convention appointed an executive committee, known as the Committee of Public Safety, which assumed dictatorial powers and inaugurated the Reign of Terror. More than 2500 prominent persons, including Queen Marie Antoinette, were sent to the guillotine. The Worship of Reason was established, and the restraints exercised by religion became inoperative. But the iron rule of the Committee saved France. Civil war was suppressed, new legal codes were adopted, the army was reorganized, the invaders were driven out and the Austrians were defeated. Gradually one man stood out preeminent—Robespierre. At his instigation the Committee had executed Danton, one of its chief leaders, for suggesting that the Terror had gone far enough; and shielded by his great popularity, the Committee continued its work. But Robespierre's own time finally came. A plot was formed against him, and he was tried and beheaded in July, 1794, bringing the Reign of Terror to an end.

The Convention now resumed its authority, restricted the powers of the Committee of Public Safety, dissolved the Revolutionary Tribunal, closed the Jacobin Club and recalled the Girondists and conservatives. The Constitution of the Year III was adopted in the summer of 1795, placing the government in the hands of a Directory of five persons and two legislative bodies, the Council of Ancients and the Council of Five Hundred. The establishment of this constitution led to an uprising in Paris, the suppression of which by Napoleon Bonaparte brought him into prominence.

The military success of the last months of the Convention promised the continue under the Directory. Napoleon won brilliant campaigns against Austria in Italy, and became the popular idol. But the Egyptian campaign, which he now undertook, was a failure, and Austria took advantage of his absence to recover the lost ground in Italy. Neither was the Directory succeeding at home. There was friction with the legislative bodies, the finances were mismanaged and discontent became prevalent. The leaders turned to Napoleon as the only man who could save France from ruin. At their invitation he returned from Egypt, and with their cooperation overthrew the Directory and Councils on Nov. 9, 1799. A new constitution was drawn up establishing the Consulate, to consist of three men; and Napoleon was made first consul with dic-

tatorial powers, thus bringing the Revolution practically to a conclusion.

For the subsequent history see NAPOLEON I and FRANCE, subhead *History*. See also MIRABEAU, GABRIEL HONORÉ RIQUETTI; MARAT, JEAN PAUL; DANTON, GEORGE JACQUES; ROBESPIERRE, MAXIMILIEN; NECKER, JACQUES; MARIE ANTOINETTE; GIRONDISTS; JACOBINS.

French Somaliland, *So mah' le land"*, or **Somali Coast Protectorate,** a small group of French possessions in eastern Africa on the Gulf of Aden. Jibuti, the capital, is also the chief city. The country consists of about 1000 sq. m. of fertile plateau, but is only sparsely inhabited.

Frenchtown, Battle of. See RIVER RAISIN, BATTLE OF THE.

French West Africa, a name applied to the French possessions known separately as Senegal, French Guinea, Ivory Coast, Dahomey, Upper Senegal and the Niger. Its total area is 1,330,887 sq. m. The country is under the rule of a French governor-general, whose residence is at Dakar, a fortified naval station in Senegal. The colonies making up French West Africa are described under their separate titles. See FRENCH GUINEA; IVORY COAST; SENEGAL.

Freneau, *Fre no'*, **Philip** (1752-1832), an American poet, born in New York City. He wrote satiric verse and prose, and in 1791 Jefferson induced him to take charge of the Anti-Federalist *National Gazette*. He preferred life on the sea to journalism and soon abandoned that profession. As the first American poet of distinct ability he wrote *The Rising Glory of America, The Indian Burying-Ground, The Wild Honeysuckle* and *Eutaw Springs*.

Fresno, *Frez' no,* **Cal.,** a city and the county seat of Fresno Co., 209 m. s.e. of San Francisco, on the Atchison, Topeka & Santa Fe, the Southern Pacific and other railroads. It is situated in the San Joaquin Valley (about 300 ft. above sea level), which is naturally arid, but which is under an extensive system of irrigation. Grains and fruits are grown in abundance, Smyrna figs and raisins being among the leading crops. Grapes, oranges and olives also are extensively cultivated, and there are numerous wine-making and fruit-drying establishments. Stock raising is an important industry, special attention being given to sheep and horses; lumbering and mining are extensively engaged in, and the oil interests are important, producing one-thirtieth of the world's supply. In addition to the industrial features, there are several noteworthy objects of interest, among them the United States Government Building and a Carnegie library. There are a number of fine hotels. Fresno was laid out and incorporated in 1872 and two years later became the county seat. It was chartered as a city in 1885. Population in 1920, 45,086.

Frey, *Fra,* in Scandinavian mythology, loving god of sunlight and of warm summer rains, was son of the sea king, Niörd, and brother of Freya. According to Northern custom, Frey received many valuable gifts when he cut his first tooth: the beautiful realm of Fairyland; a magic sword, invincible, which fought, on being unsheathed, of its own accord; a golden-bristled boar of incredible speed; a dauntless horse which could leap through fire and water; and a most marvelous ship which could sail as well on land as on water, if need be could accommodate all the gods, and could be folded up, like a napkin, and tucked out of sight. Frey fell in love with beautiful Gerda. Being diffident, he left his wooing to a trusty servant, to whom he lent his horse and to whom reward for success was his magic sword. Frey was later slain by the dazzling blade of the mighty flame-giant. Not only was Frey god of sunlight, fruitfulness, peace and prosperity, but he guarded horses and horsemen and rescued all prisoners. Oxen and horses were the principal sacrifices in his shrines, where no weapons ever entered. Yule month, when boar's flesh was eaten, was sacred to him.

Freya, *Fra' ya,* in Scandinavian mythology, sister of Frey, was martial god-

dess of beauty and love. She often accompanied the Valkyrs to battle, where she selected and claimed half the slain warriors. This accounts for the breastplate, helmet, shield and spear with which she is represented. When deserted by her roving husband, Odur, the summer sun, Freya hunted him through all the world, the while shedding tears which turned to gold or to amber. She owned a dazzling necklace fashioned by the dwarfs, and falcon plumes, which enabled her to fly across the sky like a bird. Cats drew her chariot. The swallow and cuckoo were her favorites. Friday was sacred to her worship. Charlemagne destroyed the last of her many temples at Magdeburg, Germany.

Fri'ars. See DOMIN' ICANS.

Fric'tion, in physics, the resistance, due to its contact with other bodies, which a body offers to actual or possible motion. The surfaces of bodies, though seemingly perfectly smooth to sight and touch, have many minute inequalities which cannot be removed. Thus, when the surface of one slides upon the surface of the other the elevations of one project into the other's depressions and tend to retard the motion. There are two kinds of friction, known respectively as sliding and rolling friction; the first is exerted when a book is pushed across a table; the second, when a wheel rolls along a surface. In machines sliding friction occurs more commonly than rolling friction.

Experiments for investigating friction are easily performed. A block, having its three dimensions unequal, placed upon a table and connected by a string passing over a pulley, with a weight, serves as apparatus. If the block is pulled across the table first upon its broadest side and then upon its others in succession, the force required to overcome the friction will be found to be the same in each case. Weights placed on the block show that friction increases in proportion to the total force pressing the two surfaces together and that it is independent of the area of the surfaces in contact. It is also shown by experiment that the force required to overcome friction is the same for all ordinary speeds; but it is greater for exceedingly slow speeds, especially noticeable in starting one body to slide along another, and it appears to be less for very great speeds. Friction varies greatly with different substances, and in engineering work the coefficient of friction between two surfaces of the same or different materials is defined as the force required to slide one surface along the other divided by the total force pressing the two surfaces together. The coefficient for iron sliding on iron is about 0.2; that for oak wood on oak wood about 0.4. Thus a locomotive pressing with a weight of 100,000 lb. on the driving wheels can exert a pull of .2 of this weight, that is, 20,000 lb. pull; practically, however, somewhat less. In rolling friction, the force required to overcome friction decreases as the diameter of the wheel increases. A wagon with large wheels is more easily pulled along a road than one with small wheels. Rolling friction is very much less than sliding friction; hence the great use of roller and ball bearings wherever practicable. The bicycle would have been almost impossible without ball bearings.

In all journal bearings like the axle in the hub of a wagon wheel or the pivot of a watch in its jeweled bearing, we have sliding friction; the smaller the diameter of the axle or pivot, the less is the surface. The rubbing surfaces must be made to slide over one another; hence the less the energy that must be spent in overcoming friction. In fine pivot bearings and in most journal bearings of machinery it has been found that it is better to have the shaft or pivot of one material and the journal or socket of another. In this manner friction and wear are both decreased. In all such bearings the use of oil between the rubbing surfaces greatly reduces the friction.

In machinery, friction is generally considered a great hindrance, since it uses up force in overcoming it which might be otherwise employed; practically, however, friction is of great value. It holds

objects firm and causes the heavier, by their very weight, to stand more solidly; it holds bolts and screws in place, keeps the fibers of thread tight and even makes it possible for us to stand, to walk and to hold objects in our hands.

Fluid Friction. When a solid moves through a fluid, either a liquid or a gas, the resistance encountered is not independent of the speed, as is the case for one solid sliding on another. Fluid friction increases with the speed; it is very little at low speeds; it increases about proportionally to the speed for moderate speeds; and it increases very much more rapidly for high speeds. Thus, it requires only a small force to push a boat through the water at a speed of a few feet per minute, while to increase the speed of an ocean liner from 20 to 25 m. per hour requires an enormous increase in engine power. Likewise, the friction of wheels on the rails and the axles in their journals is much greater than the friction of the train against the air at low speeds of a few miles per hour; but at high speeds of 50 to 60 m. per hour, the air friction is by far the greater resistance to overcome.

Fri'day, the sixth day of the week. The name is derived from that of Frigga, Scandinavian goddess, wife of Odin. This day among Germanic peoples was sacred to Frigga. In very early times in the Christian Church Friday was consecrated to the commemoration of the death of Christ, which occurred on that day. Good Friday, the Friday before Easter, is quite generally observed among Christians, and the Roman Catholic and Anglican churches designate all Fridays (except those on which Christmas falls) as days of abstinence from flesh meat. The somewhat prevalent superstition that Friday is an unlucky day originated probably with its connection with the crucifixion. See Frigga.

Friendly Islands. See Tonga Islands.

Friends, or The Society of Friends, a Christian sect commonly called Quakers. The name Quaker was originally applied in derision. Their founder, George Fox, began to preach in England about 1647, soon gathering about him a following of those dissatisfied with the religious teaching of the day and desirous of a higher spiritual life. During the reign of Charles II the Friends suffered severe persecution, and it was not until after the Revolution of 1688 that they were free from serious interference. Spreading to America, the Quaker movement exercised considerable influence in the colonies, and it was a Quaker, William Penn, who established the Pennsylvania Colony. The Quakers were subjected to persecution in the New World, but persevered in establishing their Church. In 1827-28 a division occurred, under the preaching of a Friend of Unitarian tendencies, named Elias Hicks. The two bodies are frequently called Orthodox and Hicksite, though the latter and smaller party preferred to be known as the Liberal Branch.

The Friends hold views very similar to those of other Christian bodies, but they have a distinguishing doctrine. This is the belief in the immediate personal teaching of the Holy Spirit to the individual, often called the Inner Light. In conducting their public worship they depend entirely on the guidance of the Holy Spirit, usually sitting in silence until someone feels that he has been called upon by the Spirit to speak. They believe in a spiritual baptism and communion service, not an outward ordinance; they refuse to take and administer oaths; they protest against warfare in any form and advise the refusal to aid in military affairs. The ministry to them is not a profession and is not put upon a pecuniary basis. Their form of government is simple. In 1919 the Orthodox Friends in the United States numbered about 100,000; the Hicksites, 19,595.

Frig'ate, a warship of great speed. In olden times the frigate was a long, narrow warship propelled by sails and oars, used on occasions where great speed was necessary. The term was later applied to a larger class of ships smaller than the regular battleships. They were

used in the 18th and 19th centuries as cruisers and scouts, usually joining the line of battle in an engagement. In modern times the name is applied to ironclad vessels of great speed and power. See NAVY; SCOUT.

Frigate Bird, a bird of the Man-of-War Family. The frigate birds are sea birds and may be known by their large size (over 40 inches) and long, narrow wings, which have a spread of 12 ft., forked tail, long, hooked bill, partly webbed feet and black color. The sides and breast are white in the female. The nest is very large, made of sticks, and is placed in the tops of low trees and in bushes. One white egg is laid. The young are naked when hatched and are brooded by the parents. Later, they are covered with a white down which precedes the true feathers. The frigate bird is abundant on tropical and subtropical portions of the Atlantic and Pacific coasts. It is casual as far north as Wisconsin and Nova Scotia. The name is given on account of the bird's swift flight.

Frig'ga, a queen of the gods and goddess of the clouds, was the wife of the Norse Odin, with whom she sat on royal Hildskialf, whence they could see over the entire world. She spent most of her time spinning bright-colored clouds on what is known as Frigga's Spinning Wheel in the North, and Orion's Girdle in the South. Heron plumes decked Frigga's hair, and her white robe was bound with a golden girdle from which were suspended her household keys. Although an influential goddess, she had no shrines and worship was accorded her only as Odin's favorite wife.

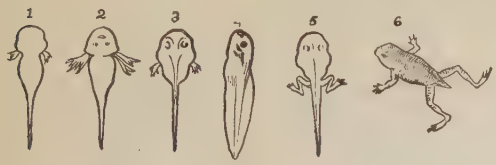
Fro'bisher, Sir Martin (about 1535-1594), a famous English navigator. In the hope of reaching the East by a northwest passage, he made three trips to the Arctic regions, where he failed in attempting to settle a colony. It was in 1576-78 that he sailed into what is known as Frobisher Bay. Subsequently he engaged in expeditions against Spain and was killed while attacking Brest.

Froebel, *Frub' bel,* **Friedrich Wilhelm August** (1782-1852), a German educational reformer, a true lover of children, the originator of the kindergarten and its system of instruction. Born at a small village in the Thuringian forest, the son of a Lutheran minister, left motherless in early childhood, and in boyhood enjoying few educational advantages, he began teaching at the age of 21 in a model school at Frankfort-on-the-Main, where it soon appeared that he was, as the Germans love to say, "a teacher by the grace of God." He later studied at Berlin and Göttingen, and spent three years in study and teaching under Pestalozzi at Yverdun. Although not a Prussian, he was heart and soul a German. Hence, he dropped his studies at Berlin in 1813, and served in a volunteer corps against Napoleon; for, as Froebel said, "How could any young man capable of bearing arms become a teacher of children whose Fatherland he had refused to defend?"

His attitude throughout life is indicated by the statement that "his hands were made for giving not for receiving." Like many other great men, he was not understood by those of his time. In youth he was called "a moon-struck child;" in his mature years, "an old fool." But now men see that he clearly understood the requirements of education, and that the child's training should be a development from within, not a prescription from without. Hence, his life and work have already modified educational methods in schools of all grades. Hewn deep in the solid rock of the Glockner Mountain, the word *Froebel,* in great letters, today reflects his fame. But the kindergartens of the world are his best memorial. See KINDERGARTEN.

Frog, a small animal that lives part of the time in the water and part of the time on land. Frogs belong to the Ranid Family. They have large heads and mouths, and long sturdy legs by means of which they hop about on land. Frogs differ from toads by having a smooth skin, generally of a green color, but often beautifully striped or spotted. They

have a small tongue and well-developed teeth. The eggs are deposited in water in the spring, where they form a thick jellylike mass. Before reaching the stage of complete development the young are



DEVELOPMENT OF THE FROG

called tadpoles or polliwogs. They live in streams and ponds and feed on grasses and seaweeds.

Gradually the head enlarges, the tail becomes narrower and shorter and the legs break through the enveloping skin as the gills disappear. In place of swimming as before, by means of a tail, they now leap through the water with a long stroke of the hind legs; their prey consists of insects, worms and small fishes. This course of development is common to all members of the order.

Frogs, like toads, shed their skins frequently, pulling them off over their heads. See TOAD; BATRACHIA; TREE TOAD.

Frogfish. See ANGLER.

Froissart, *Frwah"sar',* **Jean** (about 1338-about 1410), a French poet and historian, born in Valenciennes. Whatever is known of his life is gained from his own chronicles and poetry. At the age of 20 he began to write a history of the wars of his time, and traveled extensively over Europe to gain material for his work. He wrote verses for queens and ladies, and in England Queen Philippa was his patron until her death. His *Chronicle* covered the period from 1326 to 1400. He considered his poetry superior to his prose, but later criticism has reversed this judgment, and it is for the faithful, graphic accounts of the life and customs of his own age and not for his mechanical verse that he is remembered.

Frontenac, *Fron"te nak',* **Louis de Buade,** COMTE DE (about 1620-1698), a French soldier and early governor of New France in America. After winning distinction in Italy, Germany and Flanders, he was made governor of New France in 1672. The following year he commissioned Joliet to find the Mississippi. For him, La Salle named Ft. Frontenac at Kingston, on Lake Ontario. He was tactful with the Indians, and New France prospered under his rule. However, he was recalled in 1682, only to be reinstated by Louis XIV in 1689. It was then, during King William's War, that he undertook his great plan of conquering the English settlements in New York, New Hampshire and Maine, but without any permanent success. Later, attacking the Iroquois of New York, he dealt them a blow from which they never recovered, and they were glad to sue for peace, 1696.

Frost. When the air is cooled to the dew point, it is saturated with moisture at that temperature. If cooled still further, some of the contained moisture will condense as rain, fog, snow, hail, dew or frost. Frost is formed on the surface of the ground or other exposed objects when the dew-point temperature of the air is below 32° F. and the radiation of heat from the ground cools the ground and the air immediately next to the ground, below the dew point. The excess moisture in the air is then deposited directly as frost without passing through the condition of liquid drops. Such frost is frequently called white frost, or hoar frost. The heavier hoar frosts occur under weather conditions similar to those under which the heaviest summer dews are formed; namely, on clear, calm nights when there are no clouds or smoke banks to hinder the cooling of the ground and other exposed surfaces by radiation. See DEW; VAPOR.

Frostbite, the frozen or partly frozen condition of a part of the body caused by exposure to intense cold. The feet, hands, nose and ears are the parts oftenest frostbitten. In cases of slight injury, cold treatments, such as rubbing with snow or the use of cold water, are efficacious in restoring vitality to the chilled member. When the part has been completely frozen as the result of long ex-

posure to severe cold, it may die or decay, making amputation necessary.

Froude, *Frood,* **James Anthony** (1818-1894), an English historian, born in Dartington. In 1689 he was made the rector of St. Andrews University, and a short time afterwards visited South America in the interests of the British Government, publishing reports relative to his investigations. He made extended tours through the United States, West Indies and Australia. His historical writings are distinguished by brilliancy and picturesque narrative rather than accuracy, and because of his prejudices he cannot be ranked among the best historians. He published *The Nemesis of Faith, The History of England from the Fall of Wolsey to the Death of Elizabeth, Short Studies, Reminiscences of Thomas Carlyle, Letters and Memorials of Jane Welsh Carlyle,* and *Life of Lord Beaconsfield.*

Fruit, the part of a plant which ripens with the seeds and either encloses them or bears them upon its surface. Technically, it is the matured ovary and its coverings. In common usage, a fruit differs from a vegetable in being the product of any plant, herb, shrub or tree having a decided flavor and generally being eaten raw as dessert. Fruits are botanically classified according to their composition as follows: simple, when they arise from a single, simple pistil, as the peach, and this may or may not include the old calyx of the flower; aggregate, when a cluster of simple pistils have ripened in a mass, as the raspberry; accessory, when the supports of the pistil have ripened with it, as the wintergreen; multiple, when formed from several consolidated flowers, as the pineapple.

In regard to texture, fruits are classified as fleshy, having a juicy covering; drupes, or stone fruits; and dry fruits. Fleshy fruits are subdivided into the berry, the pepo, of which the melon is an example, and the pome, or applelike fruits. Stone fruits have hardened centers surrounded by juicy coverings. Dry fruits are grains, nuts, pods, cones, key fruits, or akenes, and capsules.

In reference to the dissemination of their seeds, fruits are said to be dehiscent or indehiscent according to whether they do or do not open at maturity. Pods are dehiscent fruits. Fleshy and stone fruits are indehiscent and depend for the dissemination of their seeds upon the decay of the fleshy part or upon their being set free by the animals that eat them.

The production of new and choice fruit with better flavors and fewer inedible parts is becoming one of the chief aims of horticulturists in the United States and other countries. See BURBANK, LUTHER.

Fruit Thrush. See BULBUL.

Frye, *Fri,* **William Pierce** (1831-1911), an American statesman, born at Lewiston, Me. He graduated at Bowdoin College in 1850 and entered the profession of law. He was a member of the State Legislature in 1861-62 and again in 1867, meantime serving as mayor of Lewiston in 1866-67. The next two years he was attorney-general of the state, after which he served in the lower house of Congress for ten years (1871-81), when he became United States senator, to succeed James G. Blaine. In 1898 he was one of the commissioners to negotiate the treaty of peace with Spain. In 1901 Frye became president *pro tempore* of the Senate.

Fuchow, *Foo' chou',* or **Foochow,** a city of China, capital of the Province of Fukien, situated on the Min River, 140 m. n. of Amoy. A stone wall 30 ft. high surrounds the city and the so-called "Bridge of Ten Thousand Ages" spans the river. On the river itself dwells a large floating population. The arsenal on Pagoda Island, established in 1867, formerly turned out a number of small gunboats; it is now the point at which seagoing vessels anchor. Several missions have been established in the city since 1846. The European commerce is significant, as also is that with America, while the trade with Australia and New Zealand is on the increase. Exports consist principally of opium and tea; native merchants bargain over the staples, timber, cotton and woolen goods,

paper, olives and oranges. Population, estimated at 700,000.

Fuchs, *Fooks,* **Leonhard.** See FUCHSIA.

Fuchsia, *Fu' shi a,* a name applied to a class of plants of the Evening Primrose Family, whose individuals are herbs, shrubs or trees, chiefly natives of the Andes. Our most common species is a garden plant cultivated for its beautiful flowers, which drop from their stems and give the plant the apt name, ladies' ear drops. There are many varieties, but the flower most commonly known has a white or pale pink tube, surrounding the base of the red, blue or violet petals, from the midst of which extend the long, drooping stamens. The tree fuchsia is found in Mexico and is a stout shrub with rose-colored flowers. The name fuchsia is derived from that of a noted German botanist, Leonhard Fuchs, who named the parts of flowers.

Fu'el, a substance used for producing heat by combustion. Fuels are of three classes, solid, liquid and gaseous. The solid fuels most extensively used are coal, wood, peat, charcoal and coke. Coal and wood are used in the natural state, but charcoal and coke are manufactured fuels. They are used extensively in smelting ores and reducing metals, since they contain no impurities that will injure the metal, and produce intense heat. Briquettes are small bricks of coal slack cemented together by clay or some other adhesive substance. In some localities they are used for warming houses. The liquid fuels are certain animal and vegetable oils, crude petroleum and its products, kerosene and gasoline. Fuels of this class contain the greatest amount of heat energy. They are used chiefly in producing steam in steam engines and as a source of power in gas engines.

The gases used for fuel are natural gas, coal gas, water gas, producer gas and blast-furnace gas. Gaseous fuels are very convenient, and in cities are used for cooking and to some extent for warming dwellings. In the manufacture of glass and some other products, a gaseous fuel is essential for melting the raw material. See COAL; CHARCOAL; PETROLEUM; KEROSENE; GASOLINE; ALCOHOL; NATURAL GAS; GAS, ILLUMINATING; COMBUSTION.

Fugitive, *Fu' ji tiv,* **Slave Law.** Preceding the Civil War, Congress in 1850 passed an act known as the Fugitive Slave Law, which provided for the return of slaves who had escaped from one state to another. Under the provisions of this act any slave escaping should be returned as soon as apprehended, and it became the duty of every officer to exercise great diligence in the pursuit and capture. The North never gave the measure its approval and some states passed special "personal liberty" acts to counteract if possible the effect of the act of Congress. There was also a fugitive slave law passed in 1793, but in the early days of the nation it excited little comment, as the institution of slavery at that time had not gained public interest.

Fujiyama, *Foo' je yah' ma.* See JAPAN, subhead *Physical Features.*

Fuller, Melville Weston (1833-1910), a chief justice of the United States Supreme Court, born at Augusta, Me. He graduated at Bowdoin College in 1853, studied law at Harvard and was admitted to the bar in 1855. He was editor of the Augusta *Age,* served on the city council, and was city attorney. In 1856 he moved to Chicago, where he practiced law successfully for 32 years. He was elected to the Illinois Legislature in 1863. President Cleveland appointed him chief justice of the Supreme Court in 1888, where he served until his death. In 1899 he was one of the arbitrators in the Anglo-Venezuelan controversy. As a jurist and judge he ranks among the most distinguished in America.

Fuller, Sarah Margaret, MARCHIONESS OSSOLI (1810-1850), an American author, born in Cambridgeport, Mass. She was the eldest child of Timothy Fuller, a prominent lawyer, who conducted her education so zealously that she became a youthful prodigy to the permanent injury of her health. After teaching in private schools in Boston and Providence

she conducted *The Dial,* the magazine representing the ideas and aims of the Transcendentalists, in 1840-42. She removed to New York in 1844 at the request of Horace Greeley, to write literary criticisms for the *Tribune.* In 1846 she went to Europe, and in the following year she was married to the Marquis Giovanni Angelo Ossoli, whom she met in Rome. Both took active part in the Italian struggle for independence in 1848-49, she taking charge of two hospitals. They sailed for America in 1850, but were drowned off Fire Island Beach. Her brilliant conversational powers and personality revealed a depth of sympathy and intellectual power not so apparent in her writings. She was an especial friend of Emerson and one of the Brook Farm visitors. Her works include *Summer on the Lakes, Woman in the Nineteenth Century, Papers on Literature and Art,* letters and translations. See TRANSCENDENTALISM; BROOK FARM.

Fuller's Earth, a clay composed of oxides of aluminum, iron, calcium, sodium, magnesium, etc., and once widely used in cleansing wool and cloth of grease. This process, called fulling, gave the name to the clay. Now it is more commonly used for purifying cottonseed oil and lubricating oil by filtering them through the clay. Fuller's earth is fine-grained, soapy to the touch and of a variety of colors. It was once mined only at Reigate in England, but recently deposits were found in Florida, South Dakota and other localities in the United States.

Fulling Mill, a contrivance for cleansing, scouring and pressing woven woolen goods so as to render them stronger, firmer and closer. It consists of a wheel, with its trundle, which gives motion to the tree, or spindle, whose teeth communicate that motion to the stampers. These fall into troughs, wherein the cloth is put, with fuller's earth, soap and water.

Ful'mar, sea birds related to the albatross and the petrel. They are web-footed, with rather long bills, hooked at the end, and with tubelike nostrils. A number of species are known, several of which inhabit both the Atlantic and Pacific oceans. The giant fulmar of the Pacific Ocean measures three feet in length and has a wing spread of seven feet. This bird has two phases of plumage; a light phase, with white under parts, and a dark phase in which the whole bird is brownish. The white eggs of the fulmars are laid on the bare rocks of high cliffs. The eggs of the fulmar petrel of the Atlantic Ocean are highly prized as food, and the fish oil in its stomach is an article of commerce.

Fulton, N. Y., a city of Oswego Co., 25 m. n.e. of Syracuse, on the Oswego River, the Oswego Canal, the New York Central and the New York, Ontario & Western railroads. In 1902, the villages of Fulton and Oswego Falls were consolidated and chartered as a city. Fulton has a fine library and public buildings of interest. The city carries on a large trade in tobacco and milk and its manufactures include flour, woolen goods, excelsior, water motors, motor boats, canoes and yachts. Population in 1920, U. S. Census, 13,043.

Fulton, Robert (1765-1815), an American mechanical engineer and inventor of the steamboat, born at Little Britain, Pa. He began life as a portrait and landscape painter, and went to London to study under West. While in England he turned his attention to mechanics, for which he had a great liking and decided ability. In 1796 Fulton went to Paris, where his principal work was the preparation of torpedoes to be used in naval warfare, and the invention of a submarine torpedo boat. He did not succeed at that time and he turned his attention to the application of steam to navigation. He launched a small steamboat on the Seine River in 1803, but the boat sank almost immediately. A second trial, however, was more successful, although no considerable speed was attained.

Nevertheless Fulton considered that his inventions were deserving of more recognition than they were receiving in Paris, and in 1806 he returned to New York; he perfected his torpedo system,

which was later adopted by the United States Government; and in 1807 launched the steamboat *Clermont* upon the Hudson River, in the presence of thousands of spectators. It was a success. Steam had been successfully used in navigation before this in Scotland, where Fulton is said to have secured his plans. Fulton's reputation was now thoroughly established, and he entered the employ of the United States Government. In 1814 he constructed the first steam warship. His numerous patents were often infringed and he became involved in many lawsuits, so that he never reaped any large fortune from his inventions. He died in New York while improving his torpedo. See STEAMSHIP.

Fun'dy, Bay of, an inlet of the Atlantic Ocean, separating Nova Scotia from New Brunswick and the State of Maine. It extends 180 m. from northeast to southwest and varies in breadth from 30 to 50 m. At its inner extremity it divides into two inlets, Chignecto Bay and the Minas Channel. It receives the St. John and the St. Croix rivers; its strong tides render navigation dangerous, as they rise at certain seasons to a height of 53 ft. At low tide the mud flats and estuaries along the shore are completely drained. The Grand Manan is one of several islands.

Fungicide, *Fun' ji side,* a substance that kills fungi. Its use is most common among horticulturists who have learned that when a tree or shrub supports a parasite its own productive ability is impaired and a diseased condition results. The protection of shade trees, grains and ornamental shrubs, as well as of the fruit-bearing plants, is also attracting attention. To use fungicides effectively some knowledge of the fungus causing the disease is necessary, since the same fungus is apt to assume many different forms. For instance a pear-leaf fungus spends one period of its existence upon the juniper and may be eradicated by destroying the juniper shrubs. Many a fruit grower has cut down his valuable pear trees in a vain attempt to drive out the disease, while the unsuspected juniper, the real cause of the trouble, has been allowed to live. In the same way wheat rust cannot live except in the neighborhood of barberry bushes, upon which it spends one season of its growth. Knowledge of a few such facts often avails more than the knowledge of poison sprays.

If trees or shrubs are affected a description of the symptoms shown may be sent to the state department of agriculture, which in turn will send pamphlets discussing the difficulty and its mode of treatment. Too frequently, however, a plant disease shows itself only in the last stages, when it is too late to save the affected plant. There is still time then to check its spread and to save other plants. As in most affairs, eternal vigilance is the prime necessity and an ounce of prevention is safer and easier than later attempts at curing.

There are a few fungicides which may be recommended for general use. To be of value they should have the following points: ability to destroy the fungus without destroying the host; comparatively simple means of preparation and application; moderate cost. Those which have been proved to be the most effective are: Bordeaux mixture; ammoniacal solution of copper carbonate; solution of potassium sulphide; solution of iron sulphate; Condy's fluid; sulphur; and quicklime.

BORDEAUX MIXTURE. Of these, Bordeaux mixture is most widely used. The 50-gallon formula for its preparation is as follows: water 50 gal., copper sulphate 6 lb., unslacked lime 4 lb. To prepare put in a barrel or large crock 25 gal. of water; suspend the 6 lb. of copper sulphate in a coarse gunny sack just beneath the surface of the water. In another vessel slack the lime by adding a quart or more of water at a time, taking care not to let the lime at any time get too dry. When a smooth paste has been made add sufficient water to bring the whole up to 25 gal. When the lime is cool and the copper sulphate dissolved pour the two together, constantly stirring the milk of lime and continuing the stir-

ring for at least three minutes after mixing. To test the mixture insert the blade of a penknife for one minute. If the surface of the steel takes on a coppery appearance more lime must be added. If the blade is unchanged the mixture is probably safe. Sometimes soft soap is added to render the mixture better able to spread upon and cling to the leaves. In using this mixture in the early spring it should be diluted somewhat, as the newly-formed leaves and buds are more tender than later ones. Fruit trees may be sprayed until the fruit is half grown, but then the operation should cease or the fruit will be imperfect.

Hot Water Treatment for Wheat and Oat Smut. The following by Swingle, taken from the United States Department of Agriculture Yearbook for 1894, gives the hot-water method for treating before planting seeds of cereals which may be affected by fungus diseases, such as smut:

"Provide two large vessels, preferably holding at least 20 gallons. One of the vessels should contain warm water, say at 110° to 120° F., and the other scalding water, at 132° to 133° F. The first is for the purpose of warming the seed preparatory to dipping it into the second. Unless this precaution is taken it will be difficult to keep the water in the second vessel at the proper temperature. A pail of cold water should be at hand, and it is also necessary to have a kettle filled with boiling water from which to add from time to time to keep the temperature right. Where kettles are used, a very small fire should be kept under the kettle of scalding water. The seed which is to be treated must be placed, half a bushel or more at a time, in a closed vessel that will allow free entrance and exit of water on all sides. For this purpose there can be used a bushel basket made of heavy wire, inside of which is spread wire netting, say 12 meshes to the inch. A sack made of loosely-woven material, as gunny sack, can be used instead of the wire basket. In treating stinking smut of wheat, the grain should first be thrown into a vessel filled with cold water; then, after stirring well, skim off the smutted grains that float on the top, and put the grain into the basket or other vessel for treatment with hot water. This skimming is entirely unnecessary with other grains, and even with wheat when only affected by the loose smut. Now dip the basket of seed in the first vessel containing water at 110° to 120° F.; after a moment lift it, and when the water has for the most part escaped, plunge it into the water again, repeating the operation several times. The object of the lifting and plunging, to which should be added a rotary motion, is to bring every grain in contact with the hot water. Less than a minute is required for this preparatory treatment, after which plunge the basket of seed into the second vessel, containing water at 132° to 133° F. If the thermometer indicates that the temperature of the water is falling, pour in hot water from kettle of boiling water until the right degree is maintained. If the temperature should rise higher than 133°, add a little cold water. In all cases the water should be well stirred whenever any of a different temperature is added. The basket of seed should very shortly after its immersion be lifted, and then plunged and agitated in the manner described above. This operation should be repeated six or eight times during the immersion, which should be continued ten minutes. In this way every portion of the seed will be subjected to the action of the scalding water.

"After removing the grain from the scalding water, spread on a clean floor or piece of canvas to dry. The layer of grain should not be over three inches thick.

"The important precautions to be taken are as follows: (1) Maintain the proper temperature of the water (132° to 133° F.), in no case allowing it to rise higher than 135° F.; (2) see that the volume of scalding water is much greater (at least six or eight times) than that of the seed treated at any one time; (3) never fill the basket or sack containing the seed entirely full, but always leave

room for the grain to move about freely; (4) leave the seed in the second vessel of water ten minutes."

Other Precautions. Although it would be impossible to give the formula for all effective solutions, a few general methods of treatment are here suggested. Burn all diseased plants, fruits and bulbs. Gathering them and throwing them upon refuse heaps or to stock only aids in spreading the disease. Remove all diseased plants immediately and spray the remaining ones with Bordeaux mixture. Never use any but old, thoroughly-rotted manure about the roots of trees, shrubs or any perennials. Cuttings or seeds from diseased plants should never be sown. As far as possible avoid massing plants. Protect wounds made by pruning by an immediate coat of tar. Avoid spreading soil from diseased orchards. Rotation of crops and planting of trap crops are advised. Massee's *Text-Book of Plant Diseases* is a helpful book on this subject. See Insecticide.

Fungus, *Fun' gus,* a name given to a low order of plants all of which are characterized by containing no chlorophyll, the green coloring matter of higher plants, and by reproducing by means of spores rather than seeds. In classification they are placed between the algæ, or seaweeds, and the mosses. At present there are over 40,000 species of fungus known and they vary in size from microscopic cells to long, threadlike structures many yards in length. Fungi are divided into two general classes: saprophytes, those living upon dead plants or animal tissue; and parasites, those growing upon living organisms. Among those of the first class are such plants as the mushrooms, puffballs and the bracket fungi found on dead trees. Those of the second class are more numerous and include smuts, rusts, mildews and molds. In structure each fungus is merely a cell or a group of cells, made up of a fluid called protoplasm and surrounded by a thin cell wall. See Mold; Yeast; Mushrooms; Fungicide.

Fun'ston, Frederick (1865-1917), an American soldier, born in Ohio. He graduated from the high school at Iola, Kansas, and from the state university at Lawrence. He became an expert botanist and was sent to Alaska to study the flora of that country. His predilections were for a military life and he was engaged on the side of the insurgents in Cuba in 1896. Afterwards he went to Manila as colonel of the 20th Kansas volunteers, but was soon promoted to brigadier-general of volunteers. He organized and was in command of the daring expedition that captured Aguinaldo. In consideration of this act he was made brigadier-general in the regular army and afterwards became major-general. He was in charge of the troops in San Francisco at the time of the earthquake in 1906. Military operations on the Mexican border in 1916, including the Mexican expedition, were under his charge.

Fur, the dressed skins of animals containing short, soft hair, and used for wearing apparel or robes. With few exceptions the most valuable furs are obtained from animals inhabiting the land and water of cold regions. The most important fur-bearing animals of North America are the muskrat, hare, squirrel, beaver, mink, sable, weasel, ermine, raccoon, fisher, skunk, badger, lynx, several species of fox, two species of wolf, bears, the fur seal, the musk ox and the otter. Some of the most valuable fur-bearing animals of other countries are the chinchilla, several monkeys, the kangaroo and the coypu, or nutria.

The skins of most fur-bearing animals contain two kinds of hair, a soft, silky covering next to the skin, and a longer, coarser hair known as the overhair. The overhair of some furs add much to their richness and beauty. In preparing furs for the market, the pelts are usually salted and dried, when taken from the animal, and in this state shipped to New York, London or Leipsic, the three leading fur markets. The final dressing of the fur depends upon the pelt and the purpose for which it is intended. If the fur is to be used in its natural state and has been taken from small animals, such as the fox and mink, the skin is

treated so as to preserve it from decay and make it soft and pliable, and is then ready for use. From some furs, such as those for the fur seal, the overhair is removed, and the fur is then colored. The pelts are scraped or shaved to make them thinner before curing. This method of treatment adds greatly to the expense of the fur. Other conditions adding to the expense are the scarcity of the animals from which the fur is taken, the difficulty of hunting and trapping these animals and the popular demand for a particular kind of fur.

HISTORY. From the earliest times men have used the skins of animals for clothing. When the American Indians were discovered, they were wearing garments made from the fur of the deer, the bear, the wolf, the buffalo and the beaver, and soon after the discovery of North America the French carried on a lucrative trade with the Indians, in which they exchanged tools, household utensils and ornaments for furs. In pursuit of this trade, the French fur traders explored most of the territory now constituting the Dominion of Canada and the northern part of the United States. In 1670 the Hudson's Bay Company was chartered, and in the course of time gained a monopoly of the fur trade of the northern part of North America. See HUDSON'S BAY COMPANY.

About a century later the Northwest Fur Company was formed by a number of Canadian merchants, and soon became a formidable competitor of the Hudson's Bay Company. In 1821 the two companies were united. The American Fur Company, organized by John Jacob Astor in 1810-12, carried on an extensive trade. Astoria, Ore., was founded as one of the principal stations, and later the operations and claims of this company were important factors in securing the Oregon country to the United States. The purchase of Alaska in 1867 gave the United States control of the most important fur-seal fisheries. For the next 40 years, this industry was prosecuted with such vigor that the seals were nearly exterminated. The governments of the United States and Canada have united in placing restrictions upon taking seal, but the problem has never been satisfactorily solved. See FUR SEAL.

Fu'ries (Erinyes, *E rin' i eez,* or Eumenides, *U men' i deez*), three Greek goddesses who punished such crimes as perjury, murder and filial thanklessness by stinging remorse. They were held in such dread that they were usually honored as *kind* or *revered* goddesses, these terms being used in a propitiatory sense. The Furies were variously represented as having serpent-wreathed heads and lolling red tongues, or as brandishing a flaming torch in one hand and a bunch of snakes in the other.

Furlough, *Fur' lo,* leave of absence granted to the rank and file of the army. It does not apply to commissioned officers. It may be granted by commanding officers of posts or by commanders of regiments to those under their control. The regular furlough is 20 days, and six weeks of furlough in all may be granted yearly to qualified men. The number of men on furlough at the same time must not exceed five per cent of the whole number enlisted.

Fur'nace, any arrangement in which heat may be produced by burning fuel. Usually it is a structure of iron or brick lined with fire brick in order to withstand intense heat. Furnaces may be used for domestic purposes, as heating rooms and cooking, for metallurgical and chemical processes and for power uses, as for steam boilers. Metallurgical furnaces are of two kinds: those in which the burning fuel and material to be treated are mixed, and those where the fire grate is separate from the flame chamber, in which the materials to be heated are placed. The blacksmith forge and the blast furnace are of the first kind, while the reverberatory furnace is of the second kind. A very small amount of heat is utilized in furnaces, as the greater part is lost in the escaping gases and by radiation. See STOVE; HEATING AND VENTILATION; BOILER; BLAST FURNACE; REVERBERATORY FURNACE; FORGE, FORGING.

Fur'ness, Horace Howard (1833-1912), an American Shakespearean scholar, born in Philadelphia, Pa. He graduated at Harvard in 1854, continued his studies in Europe, returned home to take up law and was admitted to the bar in 1859. His great service to the world, however, was in the field of literature, consisting of his Variorum edition of Shakespeare. Confessing to an enthusiastic love of Shakespeare from his boyhood, Dr. Furness began at the age of 35 to prepare the monumental work of combining into one authoritative edition the result of the critical studies of the scholars of the world, including the comments found in the works of such authors as Coleridge and Goethe. Fifteen volumes were issued before advancing years compelled him to give up the work; the first volume appeared in 1871, the last in 1907. Associated with him in his labor were his wife, herself author of a *Concordance* to Shakespeare, and his son. Dr. Furness ranks as one of the few Americans who have made original contributions to scholarship, a fact that several leading universities have recognized by conferring upon him honorary degrees.

Fur Seal, or **Sea Bear,** a member of the Seal Family whose fur furnishes the valued sealskin of commerce. There are many herds found in the Northern Pacific and a few in the extreme South, where, because of its value, this seal was being rapidly exterminated. The coat of the seal is of two kinds, a short, soft fur of dark brown and a longer of gray-brown hairs. When being prepared for the market, the long hair is removed by scraping the underside of the pelt until the hairs are loosened and fall. A herd of some 2,500,000 seals came into the possession of the United States with Alaska in 1867 and formerly yielded annually 100,000 skins. The animals are killed by being clubbed as they come to the shores of the islands, for on land they are comparatively helpless. The skins alone are packed, and these are shipped to London, where they are dressed and made into coats, caps and muffs. Destructive fishing of seals has reduced the herd and has caused a great loss to the United States financially.

The fur seal is a large species and the males greatly outweigh the females. They are affectionate animals among themselves, but when in water defend themselves gallantly against attack. See SEAL.

Fuse, *Fuze,* a casing or tube enclosing combustible materials used to set off or ignite explosives. Fuses are chiefly employed in blasting, exploding mines and igniting the charges of projectiles. The form used in quarrying and mining is a tarred rope or cord containing in its core small quantities of gunpowder and other materials, so mixed that they burn slowly. The time is set for the flame to reach the explosive by cutting the cord the proper length. Concussion fuses used in projectiles are generally devices having a cap containing a fulminating powder arranged to fire the explosives when the projectile strikes the object. The fuses of firecrackers and those used in fireworks consist of a tube of soft paper, filled with slow-burning combustibles. See BLASTING; ELECTRICITY; FIRECRACKERS; FIREWORKS; TORPEDO.

Fusel, *Fu' zel,* or **Fusel Oil,** an impurity found in spirits distilled from fermented potatoes, barley, rye, etc. It is an oily liquid, with an offensive odor and an acrid, pungent taste; it possesses stronger intoxicating effects than alcohol and is very injurious to the health. It is highly inflammable, and its composition depends upon the materials used in the manufacture of the spirit. Fusel oil may be detected in whiskey or brandy by rubbing them on the hand; the alcohol will evaporate and the fusel oil remains.

Fusion, *Fu' zhun,* the conversion of a solid, at its melting temperature, into a liquid. The amount of heat, measured in calories, required to melt one gram of a substance without changing its temperature is called the heat of fusion of that substance. Thus it requires 80 calories to convert one gram of ice at O°C into water at O°C, so the heat of fusion of ice is 80 calories per gram. See CALORIMETRY.

Fustian, *Fus' chan,* the name of certain cotton and woolen fabrics used chiefly for men's clothing. Such fabrics as jean, velvet, velveteen, moleskin and corduroy are all included under the class fustian. Fustians are usually dyed and can be obtained in a number of different colors. The name is supposed to be derived from El-Fustat, a suburb of Cairo, where the fabric was first made. Formerly fustian was used for robes worn by priests and royalty, but it is now confined almost entirely to the clothing manufactured for laborers.

Fustic, *Fus' tik,* the name of two sorts of dyewood used for coloring yellow. Old fustic is obtained from a large tree belonging to the Mulberry Family, and found in the West Indies and the tropical regions of North and South America. It is a large handsome tree, and its wood is sometimes used in cabinetwork. The dyewood is placed on the market in blocks, which have a brownish color. Young fustic is obtained from the Venetian sumac, a shrub common in southern Europe. As a dyestuff, fustic is extensively employed with other substances to produce various colors. Mixed with indigo and the salts of iron, it produces green and olive. It also furnishes the coloring matter known as moritannic acid, which is prepared in the form of yellow crystals. At present coal-tar dyes have to a great extent displaced fustic.

Fux, *Fooks,* **Johann Joseph** (1660-1741), an Austrian musician. But little is known of his early life. He was organist of one of the leading churches in Vienna, when he was appointed imperial court composer by the Emperor, Leopold I. It seems that he remained in this position until his death. Fux composed many operas, but his sacred compositions were his most enduring works. As a musical scholar he was not surpassed by any musicians of his time. His theoretical work, *Gradus ad Parnassum,* became a classic and was translated into most of the languages of Europe.

Fyffe, *Fife,* **Charles Alan** (1845-1892), an English historian, born at Blackheath, England, and educated at Balliol College. For several years he was bursar of University College. During the early part of the Franco-German War he was war correspondent for the *London Daily News.* His first historical venture was the publication of a short *History of Greece,* which was one of a series of historical primers. Between 1880 and 1890 he produced his most important work, the *History of Modern Europe.* It is a scholarly and vigorous account of the political history of Europe from the beginning of the French Revolution to the conclusion of the Treaty of Berlin, 1878. For the period which it covers, this history is considered as a standard authority.

G

GA'BION, a cylinder filled with loose material and used to sustain an embankment. The gabion is made of basketry, staves with iron hoops, a barrel with the heads out, or an entanglement of brush or wire, anything that will suffice to be placed on end and be filled with stones and rubbish, so that it will help to sustain a loose embankment. Gabions are often constructed on the field of battle from whatever material may be at hand.

Gab'bro, the name of a large group of evenly crystalline, igneous rocks of granite texture, composed chiefly of lime-soda feldspar and pyroxene. They are heavy and dark-colored, usually greenish and of much the same composition as basalt. Varieties which contain large quantities of olivine are called olivine gabbros. In the Lake Superior region and in the islands off the coast of Scotland gabbros occur in great abundance.

Gabun, *Gah boon'*, a short river of French Congo in western Africa. So many tributaries unite to form it that it may be more accurately said to be a great estuary by which these enter the ocean. The stream is 40 m. in length and is open to the largest vessels for the entire distance. Its mouth, which is but a short distance north of the equator, has the settlement of Libreville upon its north bank.

Gad, a son of Jacob and the head of one of the 12 tribes of Israel. Of this son little that is definite is told, but he is supposed to have been among those who sold Joseph into slavery. The tribe of Gad had nearly 50,000 adult male members at the time they left Egypt, and their large possessions of sheep and cattle led to their settlement in the grazing lands of Gilead, east of the Jordan. The tribe is frequently commended for its courage and activity, but so far as is known it furnished no judge, ruler or prophet.

Gad was also the name of a prophet of David's time. He is mentioned several times in *First Chronicles* as the medium through whom David received divine messages. Consult *I Chronicles xxi:9* and *I Chronicles xxix:29.*

Gade, *Gah' de,* **Niels Wilhelm** (1817-1890), a Danish musician and composer, born in Copenhagen. In 1833 he made his début as a concert violinist, and eight years later, by his overture *Echoes of Ossian,* won a prize offered by the Copenhagen Musical Union. He succeeded Mendelssohn as director of the Gewandhaus concerts at Leipsic and later became court musical director for the King of Denmark. His compositions include symphonies, overtures, sonatas, lyrical dramas, an oratorio, an opera and several vocal selections with orchestra accompaniments. Of the last, the best known are *The Erl King's Daughter, The Crusaders* and *The Springtide Phantasy.*

Gadfly, or **Horsefly,** a family of irritating and dangerous insects classed in the order Diptera. They are small insects, having strong, biting mouths with which a severe wound may be inflicted. The gadflies are annoying to cattle and are likely to spread infection and even carry disease to man. The bite of the gadfly which comes from cattle having anthrax causes a festering sore. Gadflies are locally known as breeze flies. See DIPTERA; INSECTICIDE.

Gads'den, Ala., a city and the county seat of Etowah Co., 60 m. n.e. of Birmingham, on the Coosa River, and on the Louisville & Nashville, the Southern, the Nashville, Chattanooga & St. Louis, the Chattanooga Southern and other railroads. The surrounding region is rich in timber and mineral resources, chiefly coal and iron, and a large trade is carried on. In the city are steam mills (for the production of yellow-pine lumber), steel

mills, foundries, car works, machine shops, cotton mills, cottonseed-oil mills, a pressed-brick plant, gins and manufactories of wagons, sashes, doors, blinds, handles, wire and steel nails, pipe and flour. Gadsden contains a number of fine buildings, banks, newspapers and good schools. The place was settled in 1845 and incorporated in 1867. Population in 1920, U. S. Census. 14,737.

Gadsden Treaty, a treaty negotiated with Mexico by the United States in 1853 through the agency of James Gadsden. By this treaty, which was ratified in 1854, a tract of land in the southern part of New Mexico and Arizona was purchased. Its average width is about 120 m., with an area of about 45,000 sq. m. It is bounded on the north by the Gila River, on the east by the Rio Grande, on the west by the Colorado and on the south by an arbitrary line. The United States paid Mexico $10,000,000 and made other concessions. The treaty caused much opposition in Mexico.

Gad'ski, Johanna (1871-), a German opera singer well known to English and American audiences. She was born in Anclam, Prussia, and received the greater part of her musical training in Stettin. She first appeared in grand opera in New York, where she took the part of Brünhilde in *Die Walküre,* and she has since taken various Wagnerian rôles. She has a voice of great richness and power, and is a favorite in England, where she has appeared at the Worcester Festivals and at Covent Garden. She has made several tours of the United States and is always enthusiastically received.

Gad'wall, a bird of the Duck and Goose Family, over 20 inches long. The body is grayish, with white, wavy lines on the back, white under parts, black, white and brown wings, and black rump and upper and lower tail coverts. The female is without a crest on the head; the head and neck are whitish, with fine, dark spots; the chin and under parts are white, the rest of the body being dusky, with buff-bordered feathers. The nest is placed on the ground and is made of grass, lined with down. It contains 8 to 12 creamy-white eggs. The gadwall is a duck of the marshes and smaller ponds and ranges throughout the greater part of North America. It is a well-known game bird in many localities.

Gael, *Gale,* the branch of Celts living in the Highlands of Scotland, in Ireland and on the Isle of Man. Gaelic is a dialect of the Celtic language and is spoken in the Highlands of Scotland, while Irish and Manx are spoken respectively in Ireland and the Isle of Man.

Gaff, a strong, iron hook with a long handle used by fishermen to aid in drawing in fish too heavy for the line. It must be used deftly and expeditiously when the fish is drawn near to the boat, for if the fish feels the point of the gaff but is not firmly caught it is apt to break away. Fishermen become exceedingly dexterous in "gaffing" fish and take pride in the skill which may be displayed in the performance. Small gaffs are used by anglers on the larger rivers and a somewhat similar instrument is used by whalers in handling blubber.

Gage, Lyman Judson (1836-), an American financier, born in De Ruyter, N. Y. He removed to Chicago with his parents in 1855; in 1858 secured a position with the Merchants Savings Loan and Trust Company; became manager of the Chicago clearing house; was elected vice-president of the First National Bank in 1882; and its president in 1891. He was the first president of the World's Columbian Exposition, and was twice president of the Chicago Civic Federation. President McKinley appointed him secretary of the treasury in 1897, which position he resigned in 1902 to accept the presidency of the United States Trust Company in New York City.

Gage, Thomas (1721-1787), a British general and colonial governor of Massachusetts, born in Sussex, England. He entered the army in 1741, serving in Scotland, Flanders and in America, where he took part in Braddock's disastrous expedition in 1755. As colonel he operated against Montreal in 1758, soon became governor of that city, was pro-

moted major-general and by 1763 succeeded Amherst as commander of the English troops in America. In 1768 he was placed at the head of a British force in Boston, two years later he became lieutenant-general and in 1774 was appointed military governor of Massachusetts, in which capacity he aroused much bitter feeling by his methods of enforcing the Boston Port Act and the Navigation Acts. The Battle of Lexington resulted from his order to seize the colonial supplies stored at Concord. After commanding at Bunker Hill, he was superseded by Howe and returned to England, October, 1775. He became a general in 1782.

Gail Hamilton. See DODGE, MARY ABIGAIL.

Gainesville, Fla., a city and the county seat of Alachua Co., 70 m. s.w. of Jacksonville, on the Seaboard Air Line, the Atlantic Coast Line, the Gainesville & Gulf and other railroads. The section in which the city is situated produces sea-island cotton, oranges, melons, citrus, vegetables and other farm products. The principal manufacturing establishments include bottling works and manufactories of lumber, fertilizer, ice and coffins. Rich phosphate deposits occur a short distance from the city, and the water supply is derived from a mineral spring about two miles distant. Gainesville is chiefly distinguished as a winter health resort and as the seat of the Florida State University. In the city is held the Florida Winter Bible Conference and Chautauqua. Among the interesting features of the vicinity are Alachua Sink, an intermittent lake, Payne's Prairie, Newman's Lake and the Devil's Mill Hopper. Gainesville was settled in 1850 and incorporated in 1869; it was named in honor of Gen. E. P. Gaines. The city is governed under a charter of 1907. Population in 1920, 6,860.

Gainesville, Tex., a city and the county seat of Cooke Co., 65 m. n. of Fort Worth, on the Gulf, Colorado & Santa Fe, the Missouri, Kansas & Texas and other railroads. It is situated in an agricultural and stock-raising district, of which it is the commercial center. In the city are meat-packing plants, carriage works, cottonseed-oil presses, hide and leather factories, brickyards, flour mills and foodstuff factories. A fine city hall and post office are among the prominent structures. Gainesville was settled in 1851 and was incorporated in 1873; it is administered under a revised charter of 1879. Population in 1920, 8,648.

Gainsborough, *Gainz' b'ro,* **Sir Thomas** (1727-1788), one of the greatest of English portrait painters, born in Sudbury, Suffolk. When 14 years of age he began the study of art in London and in time won recognition as a portrait painter having an unusual gift of portraying likenesses. In lightness of spirit and graceful handling he excelled, and he holds rank with Sir Joshua Reynolds among the great English masters of portraiture. Landscape painting also occupied his attention, and in this field, too, he was preeminent. Gainsborough was one of the 36 original members of the Royal Academy, founded in 1768. Among his famous paintings are *The Duchess of Devonshire, Mrs. Siddons* and *The Blue Boy.*

Gal'ahad, Sir, in legends of the Holy Grail, son of Launcelot and Elaine, a celebrated knight of the Round Table, surnamed the Chaste. He alone succeeded in clearly seeing the Holy Grail.

Galapagos, *Gah lah' pah gos,* **Islands,** a group of 13 islands of the Pacific Ocean belonging to Ecuador and lying 730 m. from its coast. The largest of these, Albemarle, has a length of 60 m., while Charles has the largest population, numbering about 400. The islands are volcanic, but are fertile in the low regions, where cotton, tobacco, oranges and figs are raised. Galapagos is the Spanish name for turtle, and is given because of the numbers of turtles that haunt these shores. Other animals such as cattle, horses, pigs and dogs, elsewhere domesticated, here run wild. Population, 600.

Gal"ate'a, a sea nymph, daughter of Nereus and Doris, loved by the Cyclops Polyphemus. When she spurned him, he killed his rival, Acis. See ACIS.

Gala'tians, Epistle to the. See PAULINE EPISTLES.

Ga'len, Claudius (131-200), a Greek physician, born at Pergamus, in Mysia. He studied medicine as thoroughly as the opportunities of his age permitted and was surgeon to the school of gladiators in Mysia for six years. He then went to Rome, where he was physician to Marcus Aurelius. He was a prolific writer, 83 of his writings being extant. Those which treat on anatomy and physiology are among his best. Galen was the first to take the pulse into consideration in determining the nature of disease. He was the authority in medicine up to about the middle of the 16th century.

Gale'na, the most important ore of lead, containing, when pure, 86.6 per cent of that metal; but it is usually mixed with copper, zinc, antimony or celenium. It crystallizes in the form of cubes, but is frequently found massive or granular; and is often found in veins or beds of amorphous or crystalline rock. It has a pure lead color and a metallic luster. Almost the entire lead supply of the world comes from this ore. It is widely distributed, and is found in Germany, Bohemia, Austria, England, Mexico and parts of the United States. Argentiferous galena, so called because of the large proportions of silver ore which it contains, is extensively mined in the Rocky Mountains. Certain varieties, called potter's ore, are used for glazing. See LEAD.

Gales'burg, Ill., a city and county seat of Knox Co., 53 m. n.w. of Peoria and 163 m. s.w. of Chicago, on the Atchison, Topeka & Santa Fe, the Chicago & North Western, the Chicago, Burlington & Quincy and other railroads. The city is attractively situated in a fertile agricultural region and extensive coal mines are located in the vicinity. Galesburg has wide, well-paved and shaded streets, substantial business blocks, numerous churches and many handsome residences. The city is well known for its industrial activities and contains large stockyards, railroad repair shops, boiler and engine works, iron foundries, agricultural-implement works, carriage and wagon factories, broom factories and one of the largest vitrified brick-paving plants in the world. Galesburg is noted for its educational facilities and is the seat of Knox College (nonsectarian), founded in 1837 as the Knox Manual Labor College; Lombard University (Universalist), named in honor of Benjamin Lombard, a benefactor; St. Joseph's Academy (Catholic); Corpus Christi College (Catholic); and Brown's Business College. There is an excellent system of public schools. A public library was founded in 1874.

The first settlement was made in 1836 by a colony from New York State and named in honor of Rev. George Washington Gale, a prominent Presbyterian minister, who desired to establish a college to supply "an evangelical and able ministry" and also make the settlement a rallying ground for abolitionists. Galesburg was granted a city charter in 1857. On Oct. 7, 1858, one of the famous Lincoln-Douglas debates was held on the grounds of Knox College. Population in 1920, U. S. Census, 23,834.

Galicia, *Ga lish ia.* The southern province of the Republic of Poland lying to the north of the Carpathian Mountains, facing Ukrania on the east. The province is roughly triangular in shape and possesses an area of over 30,000 sq. m., and a population of about 8,000,000.

The population consists, in the main of two ethnic stocks—the Poles and the Ruthenians. In the entire province, the Poles are in the majority, decidedly so in western Galicia, in eastern Galicia the Ruthenians are the most numerous except in a few localities. Ruthenian Galicia is under the mandate rule only of Poland.

The Carpathians form the southern boundary of the province and send their spurs to the north and the east and the larger part of the province is broken like the Appalachian Highland Section of the United States. Coal and zinc occur in abundance. The oil fields extend along the Carpathian mountains for a distance of two hundred and fifty miles and gasoline—called in Europe petrol—is an ex-

tremely valuable product. Salt and potash are also produced. Timber is abundant. The valleys are fertile, the usual crops of the temperate zone being raised.

Gal'ilee, the most northern of the three provinces into which Palestine was divided in the days of Christ. It was bounded on the e. by the River Jordan, on the s. by Samaria, on the w. by the Mediterranean and Phœnicia and on the n. by Syria and the Lebanon Mountains. In Galilee were located Nazareth, the boyhood home of Jesus; Cana, where the first miracle was performed; Capernaum, Nain and other places of sacred association. Galilee is now a part of the Province of Syria.

Galilee, Sea of, a fresh-water lake in central Palestine, also known as the Sea of Tiberias or the Lake of Gennesaret. It is 13 m. long and about half as wide. At the southwest corner is the outlet of the Jordan. It lies about 680 ft. below sea level, and on the east coast rise hills nearly 2000 ft. in height. Deep ravines and wild gorges, cut out by the water courses, converge to the head of this lake, and through these the cold mountain winds often rush with great violence and suddenness. The tempests which the disciples encountered on this lake, in the time of our Lord, are familiar to all readers of Biblical literature. At that time nine flourishing cities were on its shores, only two of which, Magdala and Tiberias, have remained, and they are now wretched villages.

Gal"ile'o (1564-1642), the name usually applied to Galileo Galilei, mathematician, physicist, philosopher and astronomer, born at Pisa, Italy, and educated in a monastery near Florence and later (1581-1585) at the University of Pisa. While a student at Pisa he was attracted one day by the swinging of the great lamp in the roof of the cathedral there. His study of this movement resulted in his application of the pendulum to the measurement of time. In 1585 he was obliged to leave his university course unfinished for lack of funds. But he pursued in private the study of Archimedes, which led to his invention of the hydrostatic balance. He continued the study of mathematics and natural science while teaching these subjects in Pisa University from 1589 to 1591, at the same time lecturing on some of the newer phases of science which he had discovered. These lectures were thought by the people of his day to conflict with the teaching of the Bible, and he found it advisable to resign his position. He continued his studies and lectures, however, and in 1592 was called to a chair in Padua University, where he remained for 18 years.

In 1609 Galileo perfected the telescope, and the next year he discovered the satellites of Jupiter and observed the peculiarities of Saturn, which were later more clearly defined and called "rings." During the same year he discovered spots on the sun, and, noting their movements from west to east, he worked out the theory of the rotation of the sun on an axis and determined its inclination to the ecliptic. He also discovered the phases of Mercury, Venus and Mars, and the librations of the moon. His lectures upon his discoveries, such as the laws of falling bodies, the thermometer, interesting action of magnets, and the results of his astronomical researches spread his fame throughout Europe. He accepted the view of Copernicus concerning the movements of the heavenly bodies, and this led to his persecution by the Church, though he was not punished. During the last years of his life he was blind, but he continued his work. His service to modern science is notable, for he laid the foundation upon which later scientists have built. See ASTRONOMY; TELESCOPE.

Gal'ion, Ohio, a city of Crawford Co., 80 m. s.w. of Cleveland and 15 m. s.w. of Mansfield, on the Lake Erie & Western and on the Cleveland, Cincinnati, Chicago & St. Louis and other railroads. The city is an important railroad town, being a division terminal and connecting point. It contains railroad shops, machine shops, brick and tile works, carriage and wheel factories, a lounge factory, lumber mills and roundhouses.

Galion was originally laid out by western Pennsylvania settlers in 1831. It was chartered as a city in 1878. Population in 1920, U. S. Census, 7,374.

Gal'latin, Albert (1761-1849), an American statesman and author, born in Geneva, Switzerland. In 1779 he graduated from the University of Geneva, emigrated to America the following year, and served for a brief period in the American army. He engaged unsuccessfully in business, then was an instructor in Harvard. In 1786 he became a naturalized citizen of the United States. He was influential in suppressing the Whiskey Insurrection in 1794. From 1795 to 1801 he was a member of Congress from Pennsylvania and took a leading part in the deliberations of that body as a pronounced Anti-Federalist.

President Jefferson appointed Gallatin secretary of the treasury in 1801, which position he filled for 12 years, and became known as one of the ablest financiers of America. He was one of the peace commissioners after the War of 1812, served as minister to France from 1816 to 1823, and as minister to England in 1826-27. Upon his return he was president of a New York bank from 1831 to 1839, when he retired from business, and devoted the remainder of his life to literature and historical investigations. He published pamphlets dealing with finance, the Maine boundary, the Oregon boundary, the war with Mexico, and other subjects of national importance. His scientific publications include the *Synopsis of the Indian Tribes,* and *Notes on the Semi-Civilized Nations of Mexico, Yucatan and Central America.*

Gall Bladder, a small sac attached to the underside of the liver, in which bile is stored. It is shaped like a pear, is about four inches long and two inches in diameter, and has a capacity of about an ounce and a half of fluid. Its stem connects with the cystic duct. The gall bladder serves as a storehouse for the bile secreted by the liver. During the process of digestion, the bile passes from the liver through the hepatic duct into a common bile duct and empties into the duodenum. In the intervals when it is not needed, however, the bile, which is continually being secreted, is prevented from emptying into the intestines by a sphincter muscle, which guards the opening of the common bile duct. It therefore flows backward into the cystic duct, one of the tributaries of the common duct, and enters the gall bladder, where it remains until needed. See LIVER; BILE; DIGESTION.

Gal'leon, originally the name of a warship with three or four gun decks, but later applied to those large unwieldy vessels long used by Spain in her trade with Mexico and her other American colonies. Many of these ships, although armed, fell a prey to pirates and to the navies of other countries with which Spain was from time to time at war.

Galley, a type of ship used in ancient and medieval times by all the great nations of the Mediterranean. Galleys were built for speed, their length (of perhaps 120 ft.) being six or eight times their width, and they were propelled both by sails and by oarsmen. The main mast carried a sail, yet often there were two or three masts. War galleys, however, depended principally upon their oarsmen, of whom they had so many that there were usually three banks of rowers, one above the other, on each side of the ship. Venetian galleys were larger, some being even 160 ft. in length, and are known to have carried more than 1000 men. In France, as in other countries, convicts were sentenced to penal service in the galleys, and were often branded with the letters spelling "Gal." As late as the time of the Napoleonic wars, galleys were used with much effectiveness.

Gal'linule, a bird of the Rail Family. The Florida gallinule is 14 inches long or about the size of the domestic pigeon, and is easily recognized by its bright red bill and frontal shield, long legs, long, slender, unlobed toes, dark slaty plumage with white-edged wings, and white-streaked flanks and tail coverts. The nest is built in reeds on the edge of a marsh and is made of dry grass and weeds. Eight to eleven brown-spotted,

light buff-colored eggs are laid. The gallinules are rail-like in their habits, skulking through the reeds and seldom taking to the water. The Florida gallinule ranges from Canada south to Brazil. A related species, the purple gallinule, is purplish on the head, neck and under parts, and green on the back and wings. It lives in tropical and subtropical America.

Gallnuts. See GALLS.

Gallon. See WEIGHTS AND MEASURES.

Galls, Nutgalls or **Gallnuts,** malformations of leaf, flower, branch or stem of a plant, caused by a fungus disease or by the sting of an insect. They are made noticeable by the peculiar growth of the part attacked, which generally becomes exceedingly enlarged and puts forth a thicker growth. The leaves attacked curl and grow in profuse clusters very close together. Sometimes small, hard bodies are formed, which cling tightly to the leaf. Flowers so attacked often put forth peculiar green leaves instead of petals, and trunks of trees or stems of shrubs and herbs produce gnarled and swollen protuberances which are intensely hard. Such galls formed on some varieties of oaks, and called oak galls, are used in the production of inks and dyes, and other galls are of such hardness as to take high polish and be useful in cabinetwork. The curious bunching of leaves and stems on willows, known as "willow roses," is another form of galls.

When the galls are formed by a fungus, the plant attacked has generally been wounded and the disease has entered through the wound. If caused by an insect, and this is the most common method, the tree has been stung that the eggs of the insect may be deposited in the trunk; there the larva feeds upon certain parts of the tissue and thus causes malformation. Such galls differ so widely in characteristics that an examination of them will disclose the character of the insect which caused the gall. Among the gall-producing insects are the wheat midge and Hessian fly.

Galsworthy, *Golz' wur thy,* **John** (1868-), an English author. His writings bear evidence of a marked interest in vital social problems, and, although a tinge of pessimism often colors his work, his is the method and product of an artist, and his novels and plays alike possess high literary merit. In dramas like *The Silver Box, Strife* and *Justice* he is the keen analyst of social ills, and he is always faithful to a photographic presentation of life. His dramatic creed insists on unbiased delineation; if he swerves from this it is only to yield to his pity for the lower strata of society. His novels and short sketches include *Jocelyn, The Island Pharisees, The Man of Property, The Country House, Fraternity, The Patricians, A Commentary* and *A Motley. The Pigeon,* a more recent play, was staged by the "Little Theatre" of New York in 1912.

Galt, a city of Canada in the Province of Ontario, on the Canadian Pacific, Grand Trunk and other railways, 57 m. s.w. of Toronto. Lumber, limestone and sand are supplied by the neighborhood. The manufactures include knit goods, flour, safes, edge tools, boots and shoes. The city was named for John Galt, a Scottish novelist. Population in 1911, 10,299.

Galt, Sir Alexander Tilloch (1817-1893), a Canadian statesman, born in Chelsea, London, England. He was educated under private tutors, and when 18 years of age was appointed to a clerkship in a colonization society at Sherbrooke, Lower Canada. Galt served this company for 21 years, being its president for about ten years. In 1849 he was a member of the Provincial Parliament, but resigned the same year, being chosen again in 1853 and serving until 1872. He was inspector-general of finance at two different times, and under the Federal Government was the first finance minister, laying the foundations of the present system of currency in Canada. On two different occasions he was a commissioner to the United States, and was high commissioner of the Dominion in Eng-

land from 1880 to 1883. He wrote several important political papers.

Gal'ton, Sir Francis (1822-1911), an English scientist and traveler, born at Birmingham, England. He was a cousin of Charles Darwin and, like his distinguished cousin, was noted for his studies in regard to heredity. He believed that genius, and the lack of it, is largely a matter of ancestry, and in exposition of these views he published *Hereditary Genius: An Inquiry into its Laws and Consequences; English Men of Science: Their Nature and Nurture;* and *Inquiries into Human Faculty and Its Development.* As a result of his studies, he suggested the improvement of the human species by scientific study of the laws of heredity. The science of race improvement he named eugenics, a name now widely used. Through his efforts a chair of eugenics was established in the University of London and an association founded for the further study of the subject.

Besides his work in eugenics, Galton did great service in other lines of anthropological work. He became interested in the subject of finger prints and showed how they might be used in the identification of individuals. Among Galton's publications are: *Studies in National Eugenics, Tropical South Africa, Natural Inheritance, Finger Prints* and *Memories of My Life.* See EUGENICS.

Galvani, *Gahl vah' ne,* **Luigi** (1737-1798), an Italian physician, born at Bologna, Italy. He practiced medicine in his native city until 1762, when he was chosen to the chair of anatomy in Bologna University. His experiments with animals in studying and demonstrating animal electricity and the work that he published on that subject have given him a lasting fame. Because of his refusal to take the oath of allegiance to the Cisalpine Republic he was retired from his professorship, but was recalled within a few months. The Galvanic battery takes its name from Galvani. A complete set of his works was published at Bologna in 1841. See ELECTRIC BATTERY.

Galvan'ic Battery. See ELECTRIC BATTERY.

Gal'vanism. See ELECTRICITY.

Gal'vanized Iron, a term given to iron or steel coated with zinc. The metal is first cleaned and made smooth by friction and a weak solution of sulphuric acid. It is then plunged into a bath composed of melted zinc and sal ammoniac. The zinc, on cooling, forms crystals, which give to the metal its white-mottled appearance. The coating of zinc prevents oxidation or rust from ordinary exposure to moisture. In sheets, galvanized iron is used largely in covering buildings and for roofs, cornices and water pipes. Vessels of galvanized iron are made in various forms for domestic use, but they are not suitable for holding drinking water because the zinc dissolves upon long exposure and poisons the water. Sheet-iron workers prefer to use galvanized iron instead of plain sheet iron on account of its being easier to solder in the seams and joints.

Gal"vanom'eter, an instrument for detecting the presence of electric currents and for determining their direction and strength. Galvanometers are of two general types. One consists of a freely-swinging magnetic needle about which is a fixed coil of wire. As a current is sent through the coil the side toward which the north pole of the magnetic needle turns shows the direction of the current, while the size of the angle through which the needle is turned shows the strength of the current. The simplest galvanometer of this type is probably the tangent galvanometer, which has its coil as the circumference of a circle about the needle, and the plane of the coil should be in the magnetic meridian. Another type of galvanometer consists of a coil of wire suspended between the poles of a permanent horseshoe magnet, the plane of the coil being parallel to a line joining the two poles of the magnet. As a current is sent through the coil, it turns slightly; the direction of turning indicates the direction of the current and the amount of turning the strength of the current. Gal-

vanometers of this type are called D'Arsonval galvanometers from the name of their inventor, and are the ones in most common use today. A ballistic galvanometer measures the quantity of electricity discharged by a current which acts almost instantaneously. It may be of either construction described above, the time of oscillation of its moving needle or coil usually being rather longer. Almost any galvanometer can be used as a ballistic galvanometer with more or less success.

Gal'veston, Tex., an important commercial port, the county seat of Galveston Co., located on Galveston Island at the entrance of a bay of the same name, 48 m. s.e. of Houston and 300 m. s.w. of New Orleans. It is the deep-water terminus of the Gulf, Colorado & Santa Fe, the International & Great Northern, the Missouri, Kansas & Texas, the Southern Pacific, the Trinity & Brazos Valley and other railroads and is connected by more than 60 steamship lines with other Gulf ports, the Atlantic ports of both North and South America and European ports. The island is 30 m. long and from 2 to 3 m. wide; the city lies at its eastern extremity, stretching from the bay to the Gulf of Mexico, but has its harbor upon the bay. A recently completed concrete causeway connects the city with the mainland and carries roads for pedestrians and carriages, two tracks for railroads and one interurban line. Since 1900 Galveston has been defended from the sea by a great sea wall, 5 m. in extent and rising 17 ft. above the sea, and to conform with this the city itself has been raised to the level of the wall with a slight slope towards the bay for drainage.

Streets, Parks, and Public Buildings. Galveston is essentially a modern city. Its broad paved streets are beautifully shaded by magnolias, palms, oaks and oleanders, and the parks and private grounds are filled with tropical flowers. Between the sea wall and the sea an excellent bathing beach extends to the end of the island, and this is lined with modern piers, bathhouses and casinos. This beach also forms a firm automobile course over 30 m. in length, at the farther extremity of which is the camp of the City Automobile Club. Among the handsome public buildings may be mentioned the Rosenberg Library, the city hall, with its beautiful park, a courthouse, a Masonic Temple, a Catholic cathedral and a modern Y. M. C. A. Building. Even the business blocks are pleasing, and the great hotels, among which is the Hotel Galvez, a $1,000,000 resort hostelry built by public subscription, are modern in their appointments, providing easily for the throngs of tourists that visit this Southern city. Galveston has easily taken care of 20,000 visitors overnight.

Among the educational institutions are the Ball High School, the medical department of the University of Texas, and the four Catholic institutions—the University of St. Mary, the Academy of the Sacred Heart, St. Joseph's Academy and the Ursuline Convent and Academy. In addition there are several business colleges.

Industries. Galveston is the principal commercial city of Texas, one of the greatest cotton ports in the world, and an important port of the United States in the total of its foreign business. It has several miles of wharves, which provide room for 100 ocean-going steamships at one time, while its magnificent harbor provides anchorage for 500 boats. Cotton, wool, hides, grain, flour and fruit are the chief exports. Among its industrial establishments are iron foundries, flour and lumber mills, woodenware works and manufactories of cottonseed oil and cake.

History. The Island of Galveston was discovered by La Salle in 1686, but no settlement was made until Gálvez, the governor of Louisiana, established a military post there in 1782. The post was soon abandoned, however, and the island remained unoccupied until the time of the Mexican Revolution, when the pirate Lafitte made his camp upon it and held it until driven out by the United States

Government in 1821. The present city of Galveston was settled in 1837 under the government of the Texas Republic. During the Civil War it was captured by the Federal troops, but was recaptured by the Confederates in January, 1863, and remained in their hands until the close of the war. The commission form of municipal government, now so successfully in operation in many American cities, originated in Galveston. Population in 1920, U. S. Census, 44,255.

Gama, *Gah' mah,* **Vasco da** (about 1469-1524), a Portuguese navigator, born in Sines. He commanded the Portuguese expedition sent out to find a route to India by sailing round the Cape of Good Hope. He arrived at Calicut, now Calcutta, in May, 1498, and was the first European to reach India by this route. Returning to Portugal the next year, Gama was made a noble. In 1502 he again visited Calicut, and there founded the colonies of Mozambique and Sofala. Later he was made viceroy of the Portuguese dominions in India.

Gambet'ta, Léon (1838-1882), a French statesman and patriot. He became a member of the bar at Paris in 1859. Later he attacked the ministry of Ollivier and predicted the Third Republic. He was minister of the interior during the Franco-German War and remained in Paris when the Germans began the siege of the city. He escaped in a balloon October, 1870, and managed the war from Tours. For the next few months he was practically the dictator of France. He raised army after army against the Germans, and although these armies were repeatedly defeated, the spirited resistance, inspired by Gambetta, saved the self-respect of the nation.

When his colleagues began to consider terms of peace in February, 1871, Gambetta resigned and went to Spain. He soon returned to France and was elected to the Chamber of Deputies for nine departments. In 1872 he traveled through the south of France denouncing Thiers and the National Assembly. From 1876 he was opposed to MacMahon, who was a Royalist, and he saved the country from civil strife the next year when the Duc de Broglie accepted office, hoping to restore the monarchy. Gambetta became premier in 1881, his ministry lasting a little more than two months. Just as he was beginning to consider the most important questions confronting his ministry, he was accidentally shot, and died soon after.

Gam'bia, a river of northwestern Africa, flowing into the ocean through the British Colony of Gambia. Its broad estuary, 12 m. across, gave color to the belief that the river rose in the heart of unexplored Africa. Vessels can ascend the river for 300 m., or until halted by the Barraconda Rapids at Medina.

Gamboge, *Gam boje',* a gum resin obtained chiefly from the gamboge tree, which is a native of Cambodia, Ceylon, Siam and the East Indies. The tree has smooth oval leaves and reaches a height of 40 ft. It bears small flowers and clusters of sweet edible fruit. When the bark of the tree is pierced, the gamboge flows out in the form of a thick, yellow juice, which on exposure to the air hardens. Commercial gamboge is put up in the form of sticks and cakes. It is employed in the staining of wood, in water colors and in the preparation of a lacquer for brass. It is easily crushed into a powder, is without smell and possesses an acid taste. American gamboge comes from Mexico, but the best quality is from Calcutta and Canton.

Ganges, *Gan'jeez,* a river of Hindustan, one of the great rivers of Asia. It rises in the Himalaya Mountains, being formed by the Bhagirathi and the Alaknanda rivers, and flows in a south and southeastward direction, emptying into the Bay of Bengal by numerous mouths, forming a delta about 283 m. long. Its total length is 1557 m., and its basin, lying between the Himalaya and the Vindhya mountain ranges, occupies 390,000 sq. m. of the most fertile territory in the world. The chief tributaries are the Jahnavi, Bhagirathi, Alaknanda, Ramganga, Jumna, Son, Gumti, Groga, Gandak and Kusi. New channels are constantly formed, and its course can

never be accurately described. At Benares the floods increase its width at certain seasons to 3000 ft. The flat and rolling surface of Bengal is often overflowed in July to an extent of 100 m. in diameter. On the banks of the river and its branches are the cities, Calcutta, Cawnpore, Behar, Benares, Murshidabad, Patna, Allahabad and Farukhabad. Commercially, it is of great importance. It is the sacred river of the Hindus, and in their religions it is described as the entrance to Paradise, the holiest of rivers and the cleanser of all sins. The faithful bathe in its waters on stipulated days and conscientiously distribute alms, and its waters are transported throughout India to be used in religious rites. Picturesquely situated on its banks and affording easy access to its waters, are temples, shrines and flights of steps, chief among which are those of holy Benares.

Gangrene, *Gang' green,* the death of some parts of the soft tissue of the living body. The part affected first becomes red and hot, then livid and finally dark and discolored. The dead part often sloughs off naturally, but sometimes a surgical operation is required to separate it from the living tissue. Internal gangrene frequently results fatally; but, when the disease affects an extremity, amputation can nearly always save the patient if performed in time. Formerly gangrene was prevalent in military hospitals, and was a cause of heavy loss of life in times of war. An infected wound neglected for a few hours may poison an entire limb. The methods employed today in aseptic surgery have greatly reduced the percentage of losses.

Gan'net, sea birds related to the cormorants and pelicans. They have webbed feet, strong, sharp bills and a small pouch beneath the throat. These birds are good flyers, the body being provided with numerous air sacs and the skeleton being very light. The food consists of fish, which they secure by diving from heights ranging from 100 to 200 ft. or more. The nests are placed on rocky cliffs or in low bushes and one chalky-white egg is laid. The young are naked and require nearly two months to complete their growth. Gannets live in many parts of the world. One of the largest species is the common gannet of the North Atlantic, which is three feet long; it has a white body, black primary feathers and is yellow on top of the head. The young have brown plumage, grayish below, white-spotted above, with blackish tail. The booby is related to the gannet.

Gan'ymede, in Greek myths, a beautiful Trojan lad whom Jupiter, disguised as an eagle, carried from Mt. Ida into heaven, where he succeeded Hebe as cupbearer to the gods.

Gapes, a disease of poultry caused by the presence of a tiny parasite, known as a Nematode worm. The irritation which this parasite causes impels the fowl frequently to open its beak and to cough. The disease is seldom fatal, but the irritation prevents fattening. The parasite may be driven out by mixing a small quantity of Epsom salts with the food or by swabbing the throat with a turpentine wash.

Garage, *Ga" rahzh',* an establishment where motor vehicles, particularly automobiles, are kept and cared for when not in use, and where minor repairs are made. A public garage usually keeps motor vehicles for hire, and supplies chauffeurs on call. See AUTOMOBILE.

Gar'bage, the refuse and waste matter which comes from kitchens, stores and factories. It is largely composed of decaying animal and vegetable materials, which, if not removed and destroyed, become a source of contamination to the air and water supply, causing many diseases. In small communities considerable garbage is consumed by domestic animals, but in cities it has to be collected daily and carted away. Receptacles made of strong sheet iron in the form of garbage cans, about the size of a barrel, are placed in the alleys to receive all the offal, refuse and waste matter, principally from kitchens of hotels and private houses. Covered wagons cart away this garbage during the early morning hours, and it is then either

burned in specially constructed furnaces, or in the case of a city situated like New York, it is carried out to sea in boats made for the purpose, and dumped. The expense of gathering the garbage and destroying it is a heavy outlay, but it is very necessary to do this thoroughly to prevent contagion and disease. In many European cities garbage is transported to outlying districts and used for fertilizing purposes on the land. The successful disposal and utilization of the waste materials and sewage from cities is an important problem, and in some places has been solved to the extent of making a saving by consuming the garbage and converting a large part of it to useful purposes.

Garcia Y Iniguez, *Gar se' ah e E ne' gase,* **Calixto** (1836-1898), a Cuban patriot and leader, born at Holguin, Province of Santiago, Cuba. He was a lawyer who left his practice to become a leader in the insurrection of Cuba, in 1868, against Spanish misrule. Later he became commander-in-chief of the Cuban army. He was captured and carried a prisoner to Spain; but was released only to engage in another insurrection; was captured and carried to Spain again a prisoner, being held this time for 15 years. In 1895 he succeeded in making his escape, came to the United States and engaged in piracy. He made his way to Cuba and again took a leading part in the insurrection. When the United States interfered for the protection of Cuba Garcia was appointed one of the commissioners to sit in council at Washington concerning the future of his country. He died while at Washington in fulfillment of this duty.

Garda, Lake of, a beautiful lake of northern Italy, noted for the rich vegetation of its southern and western shores and the wild ruggedness of its northern and eastern banks. It is one of the largest of Italian lakes, having an area of about 143 sq. m.; its length is 32 m. and its greatest breadth 10 m. Lying in the Alpine region, its height above sea level is 216 ft., while its greatest depth is 1916 ft. At the southern extremity is the long peninsula, Sirmione, "Sweet Catullus' almost island," having at its base the town of Desenzano, surrounded by olive orchards. The lake, the peninsula and the town with its monasteries have been celebrated by Vergil in the *Georgics* and by Catullus in many beautiful poems. The northern extremity of the lake is in Tyrol, and severe winds from the north striking through the mountain passes make the lake treacherous at certain seasons.

Gardening, raising flowers, vegetables and small fruits for home use or for a small market. Usually a number of different kinds of vegetables or flowers are planted and often a succession of crops are raised during a season. In villages and upon farms, small gardens have been the usual accompaniment of the home, but truck farmers have been depended upon to supply city trade. The high cost of living, the increasing enjoyment of outdoor recreation and the finer quality of fruits and vegetables when eaten as soon as possible after picking have led to the establishment of gardens, often exceedingly small in size, in connection with many city homes. The enjoyment derived from a well-arranged flower garden is probably as great a return as the material profit. Acting upon this principle, educators are now establishing school gardens, which give children the pleasure of gardening and teach them much practical botany by a method interesting to the pupil. See SCHOOL GARDEN.

Landscape gardening refers to the beautifying of public and private grounds by placing shrubs, trees, vines and flowers in artistic arrangement, laying out drives and walks and making artificial lakes, streams and fountains. As a profession, landscape gardening is highly considered; to practice it successfully a person must have a wide knowledge of practical botany, which not only tells what plants will grow in what soils but also at what seasons various plants will be in leaf and in bloom, what their colors will be and what their manner of growth; most important, however, is

an eye for artistic effect. Like the architect, a member of an allied profession, the landscape gardener must be able to transform the grounds upon which he works from uncouth spots to places of beauty.

Garden of the Gods, a natural park of Colorado, about 5 m. from Colorado Springs. Its rocks have been water-worn into grotesque shapes, and have received names from their real or fancied likeness to animals, buildings, human figures and other objects.

Gard'iner, Samuel Rawson (1829-1902), an English historian, educated at Oxford, Edinburgh and Göttingen. For many years he was professor of modern history at King's College, London, and subsequently at Oxford, where he declined to succeed Froude as regius professor of modern history. Gardiner wrote many valuable works, including *The History of England from the Accession of James I to the Outbreak of the Great Civil War,* histories of the Civil War, of the Commonwealth and Protectorate and of the first two Stuarts and the Puritan Revolution. He also wrote two textbooks on English history.

Gardner, Mass., a town of Worcester Co., 15 m. w. of Fitchburg and 25 m. n.w. of Worcester, on the Otter River and on the Fitchburg branch of the Boston & Maine Railroad. The town contains the villages of South Gardner, West Gardner and Gardner Center. The chief industry is the manufacture of chairs, but there are also manufactories of rattan goods, toys, tubs, pails and machinery. The surrounding country is agricultural and fruit-growing. Dunn and Crystal Lake parks are attractive features of the town. The Levi Heywood Memorial Library, a home for the aged and an almshouse are located here. Gardner was incorporated as a town in 1785. Population in 1920, 16,971.

Garfield, James Abram (1831-1881), twentieth president of the United States, born in Orange, Ohio, of New England ancestry. His father moved to the Western Reserve in Ohio in 1830, and here James was born in a log cabin in the wilderness. His father died soon afterward, leaving the mother with four small children. At the age of ten James assisted in the support of the family by working on neighboring farms in the summer, while attending school in the winter, and spending his spare moments in reading. He thus fitted himself for college, spent three years at Hiram College, Ohio, and graduated from Williams College, Mass., in 1856 with the highest honors of his class. Returning to Hiram College as teacher of Latin and Greek, he became its president the following year (1857), and widened his activities by preaching and studying law. In 1859 he was elected to the Ohio Senate.

When the Civil War broke out in 1861, he organized a regiment of his students and was appointed to its command with the rank of lieutenant-colonel. He was later given command of a brigade with instructions to drive the Confederates out of eastern Kentucky, which task he accomplished so successfully that he was made brigadier-general early in 1862. He was engaged at Shiloh, Corinth and Chickamauga, and was made major-general for gallantry on the latter field.

At the request of President Lincoln, Garfield resigned his commission near the close of 1863 to take his seat in Congress, to which he had been elected 15 months earlier. Here he became an influential leader, being a member of many important committees and rendering especially efficient service in connection with military affairs and finance. He entered the Senate in 1880.

At the National Republican Convention in June, 1880, he was nominated for the presidency of the United States by a combination of the forces opposed to a third term for Grant, and was elected in the fall, defeating General Hancock. He had served only four months, when he was assassinated by a disappointed office-seeker, and died Sept. 19, 1881, after lingering between life and death for ten weeks. His remains were conveyed amid universal mourning to Cleveland and interred in Lake View

cemetery on a beautiful eminence overlooking Lake Erie, where a magnificent monument has been erected to his memory.

Garfield was successful in all of his varied activities—as educator, soldier, statesman. He won for himself a place of the highest honor and usefulness by hard study, careful and conscientious application to the task in hand, and a singularly pure and patriotic devotion to the nation's interests.

Garfield, N. J., a city of Bergen Co., 10 m. n.e. of New York City, opposite Passaic, on the Passaic River and on the Erie Railroad. It is a residential suburb of Passaic and has many attractive residences. The city has manufactories of wax paper, perfumes, woolen yarns, essential oils, chemicals, etc. It was incorporated in 1898. Population in 1920, U. S. Census, 19,381.

Garfish, a family of fish represented in all temperate and warm countries. It has a long, snakelike body covered with tiny scales. The dorsal and anal fins lie directly opposite each other and give the caudal extremity a fanlike extension. The jaws are exceedingly long, hard and sharp-pointed and contain few teeth, but sharp ones. With the long bill a severe wound may be inflicted, and many species, especially the needlefish, are extremely active in its use. Garfish are green in color; even the bones are green, and for this reason it is not a popular food fish although its flesh is sweet and fine. Locally the garfish is called long tom or green tom.

Gar"ibal'di, Giuseppe (1807-1882), an Italian patriot. He joined Mazzini to gain Italian liberty and fled from the country when the attempt failed in 1834. He returned to Italy in 1848 and led a company of volunteers against Austria. He also lent his aid to the patriots who were holding Rome, which was then besieged by the French. When all efforts for liberty again failed, Garibaldi came to the United States and lived for a time at Staten Island, N. Y. Later he had command of a trading vessel on the Pacific coast.

In 1854 he settled on a small farm in the Island of Caprera where he could watch the result of Cavour's policy in uniting Italy. He joined the Sardinians against Austria in 1859 and objected strongly when Nice and Savoy were given to the French in 1860. The same year he sailed from Genoa with a company of volunteers. He landed in Sicily May 11, 26 days later he had won Palermo, and he gained the whole island for Italy by July 27, when the Neapolitans left Messina. He then crossed to the mainland and entered the city of Naples on Sept. 7, after a triumphal march to its gates. He resigned his command when the troops of Victor Emmanuel reached the frontier, and was again on his farm in Caprera by November.

He was eager to see the old capital, Rome, restored to Italy and made two unsuccessful attempts to regain it. In the second attempt, in 1867, he was taken prisoner by the Sardinian Government, but was released after a few days' confinement near Spezia. In 1870-1 he commanded a company of French volunteers in Burgundy against the Germans. In 1874 he entered the Italian Parliament. Consult Garibaldi's *Autobiography* (English translation).

Garland, Augustus Hill (1832-1899), an American lawyer and statesman, born in Tipton County, Tenn. He removed with his parents to Arkansas in infancy. He studied law and was admitted to the bar in 1853. Although at first opposed to secession, he finally followed his state, and was elected to the Confederate Congress, serving in both houses. In 1874 he became governor of Arkansas, and served as United States senator from 1877 to 1885. President Cleveland appointed him attorney-general of the United States in 1885, and he continued in that position until 1889, when he resumed his law practice in Washington, D. C.

Garland, Hamlin (1860-), an American novelist, born at La Crosse, Wis. He studied at Cedar Valley Seminary, Osage, Iowa, and after farming and teaching school in Illinois and Da-

kota, he removed to Boston in 1884 and devoted himself to literary work. In 1891 he returned to the West. He founded the Cliff Dwellers' Club and was its first president; in 1911 he became connected with the Chicago Drama League. His stories are realistic and abound in local color. Among his works are *Main-Traveled Roads, Jason Edwards, A Little Norsk, Wayside Courtships, Crumbling Idols, The Trail of the Gold Seekers, Captain of the Gray Horse Troop, The Tyranny of the Dark, Money Magic, Boy Life on the Prairie* and *The Shadow World.*

Gar'lic, a bulb-bearing herb of the Lily Family and closely allied to the onion and leek. It has an extremely strong odor and taste and is used as a seasoning or, in southern Europe, as a food. The bulb is made up of several smaller bulbs known as *cloves* and is the source of a bitter drug widely used in medicine as a stimulant, and as a remedy for spasms and indigestion. The garlic is mentioned in the Old Testament (*Num. xi, 5*) as being part of the food furnished to the Israelites while in bondage in Egypt.

Garnet, a class of glasslike minerals which occur in mica, slate, limestone and granite, or as a secondary form in lava and serpentine, being red, brown, green, black or yellow. Those stones which are transparent and red are known as carbuncles. The presence of aluminum increases the value of garnet, and the best grades of this variety are valuable for jewelry. The gems are classified as Syrian, Bohemian and Singhalese, not to indicate their geographical origin, but to designate their value. Inferior grades of garnet are ground and used for polishing other precious stones. Deposits occur in Brazil, Peru, Ceylon, Bohemia, Siberia and Syria, the finest coming from Syria.

Gar'nishment, a process of law by which the wages, goods or other property of a debtor which are in the possession of a third party may be seized by the creditor and applied to his claim. The garnishment consists of a legal notice to the party owing the wages or holding the property not to pay the debtor or turn over the property to him. Garnishment is carefully guarded by laws in each state. It can be applied only to a debt owing at the time it is made, and in most states the debt must amount to $10 or more. A judgment given by a Federal court cannot be garnished in a state court.

Garonne, *Ga"ron',* a river of the southwest of France. It rises at the base of Mt. Maladetta, in the Pyrenees, in the Val d'Aran (Spain), enters France in the Department of Haute-Garonne, flows northward and empties into the Atlantic Ocean at Pointe de Grave. It is 400 m. long and is navigable beyond Toulouse. The tributaries are numerous and an area of about 38,000 sq. m. is drained. The frequent overflows are highly destructive. By means of the Canal du Midi communication with the Atlantic and Mediterranean is maintained.

Gar'rick, David (1717-1779), an English actor and theatrical manager, born in Hereford. He studied at Lichfield, then at Edial under Samuel Johnson, who was seven years his senior. The two set out for London together, and Garrick's career as an actor began in 1741. His daring substitution of naturalness in voice and acting for the stately, artificial declamation of the old actors gained the applause of the critics as well as the large audiences. He was manager of Drury Lane Theater from 1747 until 1776, and this period marks a revival of Shakespearean drama and a reform of the English stage, for which much credit is due to Garrick. He wrote farces and comedies without great success, but as an actor he was vivacious and versatile to an extraordinary degree, and was unequalled in expression and in passionate rôles.

Gar'rison, William Lloyd (1805-1879), an American journalist and anti-slavery reformer, born in Newburyport, Mass. At 14 years of age he became apprentice in the office of the Newburyport *Herald,* where he remained until he was of age. When 16 years old he

began to write for the paper on the slavery question and aroused much interest. At the end of his apprenticeship he became editor of the Newburyport *Free Press,* where he was one of the first to publish poems from the pen of the then unknown Whittier. In 1827 Garrison became editor of the *National Philanthropist,* published in Boston, the first American temperance journal; in 1828 he edited the *Journal of the Times,* in the interest of the reelection of John Quincy Adams; and in 1829 he became the partner of Benjamin Lundy, a Quaker abolitionist, in conducting the *Genius of Universal Emancipation,* a journal established to advocate the immediate abolition of slavery. In this publication he was so outspoken that he was imprisoned for libel.

Upon his release Garrison immediately began to lecture against slavery, and founded *The Liberator,* which continued for 35 years and was uncompromising in its demands for the abolition of slavery. In 1832 appeared his *Thoughts on African Colonization,* and in 1834 he was influential in the organization of the American Anti-Slavery Society. He twice visited England in the interests of abolition and was warmly welcomed by philanthropists there. He had the great reward of living to see the accomplishment of the object to which he had devoted his life, and in 1865 the Anti-Slavery Society was dissolved, with its mission fulfilled. His friends raised and presented him with $30,000 for his support in his old age in recognition of his services; and after his death the city of Boston, through whose streets he had once been dragged with a rope around his body, erected a bronze statue to his memory.

Garter, Order of the, the highest order of knighthood in Great Britain. The order was founded by King Edward III in 1349 and is one of the most chivalrous orders of Europe, though not the most ancient. It was founded in honor of the Holy Trinity, the Virgin Mary, Edward the Confessor and St. George. Since St. George was the patron saint of England, the order is sometimes called the Order of St. George. The membership is limited to a small number, and election to the order is one of the highest honors that can be conferred upon English nobility.

Garter Snake, or **Striped Snake,** a genus of harmless snakes of the Colubrid Family, all species of which are found in the United States. It is the commonest of American serpents probably because it is exceedingly prolific; sometimes as many as 75 are produced in one litter. Its body is dark, marked with three yellow lines; the average length is three and one-half feet. The American boy commonly calls this serpent the streaked snake. See SERPENT.

Gary, Elbert Henry (1846-), an American judge and financier, born in Wheaton, Ill., and educated at Chicago University. He was admitted to the Illinois bar in 1867, to the bar of the Supreme Court in 1878 and practiced in Chicago for 25 years. He was general counsel for various corporations and identified himself with organizing the Federal Steel Company, of which he became president in 1898. Judge Gary was also connected with the organization of the United States Steel Corporation, of which he became chairman of the board of directors and of the finance committee.

Gary, Ind., a city of Lake Co., 26 m. s.e. of Chicago, on the Wabash, the Lake Shore & Michigan Southern, the Pennsylvania and other railroads. Interurban lines also connect with many near-by towns and cities. Gary has unequaled advantages of central location, harbor possibilities and convenience by rail and water to all markets, especially Chicago's. The initial plant established in 1906 was the Indiana Steel Company. This was followed by subsidiary plants of the U. S. Steel Company, American Bridge Company and the American Sheet & Tin Plate Company. These mammoth steel mills are all under the direction of the United States Steel Corporation. They cover over 2,000 acres between the lake front and the North Branch of the Calu-

met River. Among the independent concerns are the Gary Bolt & Screw Company, Gary Metalic Works, Union Drawn Steel Co., Gary Motor Truck. An enormous Portland cement plant is located at Buffington, adjacent to Gary.

Among the public buildings and institutions are the Y. M. C. A., Public Library, Elks' Home, Jefferson School, Gary's original educational institution, city hall, Emerson, Froebel, Horace Mann and Tolleston Schools and Gary, Mercy and Gary General Hospitals. The city was named in honor of Elbert Henry Gary, chairman of the Steel Corporation. Many other large manufacturing companies have acquired building sites there. Population, 1920, 55,378.

Gary Method. See WIRT, WILLIAM.

Gas, one of the three states in which matter can exist. A solid has a definite volume and form; a liquid has a definite volume only; a vapor or a gas has neither a definite volume nor form, but will expand and fill all the space available. There is no sharp distinction between vapors and gases. A vapor that cannot be condensed to a liquid or solid by a moderate increase in pressure or by a moderate lowering of its temperature is sometimes called a gas. What are usually known as gases are those substances whose critical temperature are so low or whose critical pressures are so high that under ordinary conditions they cannot exist as liquids. See VAPOR.

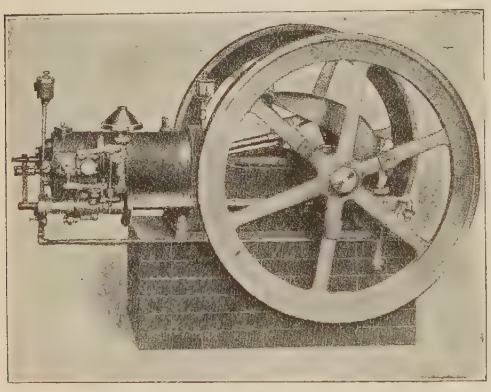
KINETIC THEORY OF GASES. Daniel Bernouilli (1700-1782) first showed that the pressure exerted by a gas could best be explained as due to the impacts of its separate particles, called molecules, against each other and against the walls of the containing vessel. Other physicists have since developed this theory much further and shown that all the characteristic properties of gases can be accounted for on the basis of these molecular motions, so that this theory is now generally accepted as giving a fairly correct conception of the structure of gases.

On this theory the molecules of a gas are constantly striking against each other and against the walls of the containing vessel, and rebounding as if they were perfectly elastic or as if they were repelled apart when they come near to each other. After rebounding, they move in straight lines till they meet other molecules, on the walls of the containing vessel. In a collision of two molecules, which may be either a direct or a glancing one, the motions of both molecules are changed, and the two molecules may have very different velocities after separating and may travel very different distances before encountering other molecules. The average distance that a molecule travels between two successive collisions is called its *mean free path;* this is large compared with the distance between centers of two molecules when they are nearest together, which distance is called the diameter of a molecule. Such a moving molecule possesses kinetic energy, due to its velocity, and what energy it may lose in any collision is gained by the other molecule, so that the average kinetic energy of the molecules, and also their average velocity, remain unchanged unless influenced by the addition of energy from outside. If the gas be heated, the energy so added goes to increase the average kinetic energy of its molecules, so the greater the average kinetic energy of the molecules of a gas the greater the amount of heat it possesses and the higher is its temperature.

Accordingly, when a gas is heated, its molecules move more rapidly and hence strike the walls of the containing vessel harder and more frequently. This results in the exertion of a greater pressure by the gas if the vessel is kept of the same volume. If the pressure is kept constant by a movable piston or other means, the gas will expand as it is heated, the same pressure exerted by the gas in the larger vessel being accounted for by the harder, though less frequent, blows of its molecules against the walls. Again, when the temperature of a gas is kept constant and the volume decreased, the blows, or impacts, of the molecules against the walls are just as

hard but more frequent, and hence the pressure is increased as the volume is decreased. In this way, the three laws of gases are accounted for on the kinetic theory. See GASES, LAWS OF.

Gas Engine, an engine similar to a steam engine, in which the piston is propelled forward in the cylinder by the explosive force of gas and air. Coal gas, producer gas, blast-furnace gas, natural gas and vaporized gasoline; naphtha, kerosene and petroleum, as well as alcohol, are employed as explosive agents. The gas is mixed with air and generally ignited by an electric spark. The largest number of this type of engines use gasoline, and they are known as gasoline engines. The only difference between them



GASOLINE ENGINE

and gas engines is that they are provided with a carburetor, by means of which the gasoline is vaporized, while engines using a gas already formed do not require this mechanism. The chief parts of a gas engine are the frame, or bedplate, carrying journal boxes; the cylinder, the piston, the connecting rod, the valve rod, the crank, the pump, valves for the admission of gas to the cylinder and its exhaust, the governor to regulate the speed, and heavy flywheels with driving pulleys.

Motion is obtained by letting gas enter the cylinder, where it is exploded by a flame, or electric spark, and causes the piston to be propelled forward, forming a partial vacuum behind it within the cylinder, and into which another supply of gas is automatically admitted. This, on being again exploded, causes another propelling forward of the piston and so on. The burnt gas exhausts at each return stroke of the piston through the exhaust valve, which is opened by a rod. A heavy flywheel is used to govern the movement, which otherwise would be irregular. A connection with a governor regulates the inflow of the gas to the cylinder.

Gas engines are made of various types, horizontal, vertical and rotary, and of sizes ranging from one-quarter of one horsepower up to 5000 horsepower. Originally gasoline engines were made with one cylinder, but now they are made with as many as ten cylinders. They are used for driving boats, bicycles, automobiles, flying machines, and in driving machinery. On the farm the gasoline engine performs many duties in driving machines taking the place largely of animal power. Gas engines have been brought to a high degree of perfection and are capable of the most delicate adjustment.

Gases, Laws of. A gas behaves as if it were perfectly elastic between wide limits of pressure and temperature. Within these limits nearly all gases obey fairly accurately the three general laws given below.

BOYLE'S LAW. This law, named after Robert Boyle (1627-1691), is: *The temperature remaining the same, the volume of a given mass of gas varies inversely as the pressure acting upon it.* Expressed as a proportion, it is V:V′ equals P′:P, from which, PV equals P′V′ equals a constant quantity. A consequence of this law is that the mass of a gas remaining the same, the density of a gas must increase as the volume decreases; hence, at constant temperature the density of a gas is directly proportional to the pressure acting upon it. In the form of a proportion the relation is D:D′ equals P:P′. For example, if 100 cubic inches of air at atmospheric pressure of 14.7 lb. per square inch be compressed into a volume of 25 cubic inches, the necessary pressure is found from the relation 14.7×100

equals P′×25, giving P′ equals 58.8 lb. per square inches, or 58.8—14.7 equals 44.1, number of lb. per square inch above atmospheric pressure. The density would be four times as great. This law is also known as Mariotte's law.

Charles's Law. This law, named after a Frenchman, J. A. C. Charles, is: *The volume remaining the same, the pressure exerted by a given mass of gas increases 1/273 of its value at 0°C. for each degree rise in temperature.* On this law are based the air and hydrogen thermometers, and from it is derived the conception of the so-called absolute zero of temperature (See Heat). For most purposes it is more convenient to write the law in the form P:P′ equals T:T′, where T and T′ are the absolute temperatures of the gas at the two pressures respectively. In this form the law states that the pressure exerted by a given mass of gas is proportional to its absolute temperature, the volume remaining the same. For example, if a given mass of gas at a pressure of 20 lb. per square inch above atmospheric pressure and temperature 27° C. be heated to a temperature of 57° C., its volume being kept the same, the resulting pressure is found from the relation P:20+14.7 equals 57+273:27+273, whence P equals 38.17 lb. per square inch, or 38.17—14.7 equals 23.47, number of lb. per square inch above atmospheric pressure.

Gay-Lussac's Law. This law, named for a Frenchman, Joseph L. Gay-Lussac, is: *The pressure remaining the same, a given mass of gas expands 1/273 of its volume at 0° C. for each degree rise in temperature.* Using absolute temperatures, the law can be stated in the form: *The volume occupied by a given mass of gas is proportional to its absolute temperature, the pressure remaining the same.* This relation can be more conveniently written V:V′ equals T:T′. For example, if 5 cu. ft. of gas at a temperature of 27° C. be heated under constant pressure to a temperature of 57° C., the final volume can be found from the relation 5:V′ equals 273+27:273+57, whence V′ equals 5.5 cu. ft.

For many purposes it is useful to combine all three laws into one general statement; namely, *For a given mass of gas, the product of its volume and pressure divided by its absolute temperature is a constant.* The corresponding mathematical relation is $\frac{VP}{T}$ equals $\frac{V'P'}{T'}$. For example, if a given mass of gas at a temperature of 27° C. and occupying a volume of 5 cu. ft. at a pressure of 20 lb. per square inch above atmospheric pressure be heated to a temperature of 57° C. and confined at a pressure of 40 lb. per square inch above atmospheric pressure, the resulting volume is found from the relation $\frac{5(20+14.7)}{27+273}$ equals $\frac{V'(40+14.7)}{57+273}$, whence V′ equals 3.49 cu. ft. See Gas; Vapor.

Gas, Illuminating, a name applied to any gases used for illuminating purposes. The raw materials employed in producing such illuminants include a variety of substances, like bituminous coal, wood, resin, oils and fats, and petroleum. When any substance that is rich in carbon and hydrogen is subjected to destructive distillation in hot retorts, it yields gas, water, tar and a residue of coke or charcoal. For the making of gas on a commercial scale, bituminous coal and petroleum are used, either separately or together, and the products are known respectively as coal gas and water gas.

Coal Gas. This gas was first successfully used in 1792 by William Murdock, a Scotchman, who introduced it in 1805 into the cotton mills of Manchester, England. It was first used in Paris in 1799, in London in 1810, in Baltimore in 1821, and a few years later it was introduced in Boston and New York. In the manufacture of coal gas, bituminous coal is heated in D-shaped fire-clay retorts of varying dimensions, holding from 250 to 350 lb. of coal. As the coal distills, the gas flows into a trap or hydraulic main, where it passes through water and loses some of its tar and ammonia. From the hydraulic main it is drawn and forced through a condenser consisting of a large cylinder containing coils of iron pipe, through which cold water is kept flowing. From this condenser the gas is

forced into a scrubber, which is another cylinder containing coke, wooden grids or other porous materials, over which water is made to sprinkle. The gas enters at the bottom and comes in contact with the water, which washes out the remaining tar and ammonia, and the gas escapes at the top. The gas is now passed into a purifier, which consists of layers of freshly slaked lime or of oxide of iron, on shelves or floors placed one above the other, and containing small openings. The purpose of the purifier is to absorb any compounds of sulphur which may be in the gas.

The gas is now ready for use and it is forced through a meter into a gas holder, which is a large cylindrical tank made of steel plates, with a dome-shaped top, and open at the bottom. This is placed in a cistern of water, and it rises on being filled with gas. The cistern is provided with a heavy frame carrying guides, so that the tank may be properly supported by means of chains running over sheaves and counterbalanced by weights. From this gas holder the gas is passed through a governor, so that the pressure may be regular under the different conditions of supply and exhaustion; then into the gas mains supplying the consumers.

Water Gas. Carbureted water gas is produced by mixing with nonluminous water gas sufficient oil gas obtained from petroleum distillate, or, as it is called by gas makers, gas oil, to give the required illuminating power. When steam is decomposed in the presence of incandescent carbon, hydrogen is set free and the oxygen unites, forming carbonic oxide. These two gases, with small portions of methane, carbon dioxide and nitrogen, form water gas, which, although combustible, does not burn with a luminous flame; therefore, it has to be enriched with oil gas, sometimes made in a separate operation, but more commonly as the water gas is made. Although there are varying methods of manufacture with different apparatus, yet the process usually employed is that in which the generator-superheater type of apparatus is used. By this the water gas is made and enriched with oil in one operation.

The apparatus commonly consists of three brick-lined, cylindrical vessels connected together and called the generator, the carburetor and the superheater. In the generator the coal is heated and the carburetor and superheater are filled with fire brick arranged in checkerwork form. The gas formed in the generator by firing the coal is employed to heat the brick checkerwork, and the coal in the generator is brought to incandescence by a forced blast. When all three of the vessels have been sufficiently heated, the blast is shut off, a valve in the stack of the superheater, through which the products of combustion escape during the heating-up period, or the blow, as it is called, is closed, and steam is turned into the generator. When the production of water gas has fairly begun, oil is admitted at the top of the carburetor, and it is quickly vaporized by the heat of the checker brick. By passing it through all the checker-brick work, it is furthermore heated so as to become a permanent gas. The gas is now purified by the same process as coal gas, requiring to be condensed, washed, purified, metered and stored in holders. Carbureted water gas is now most generally used in the larger cities, and in it are found practically the same mixtures as in coal gas, but with a large increase of the most poisonous agent, carbonic acid.

Dangers from using illuminating gas are from unburned gas, which escapes through leaks in defective pipes or fixtures, or through burners left accidentally open, and from vitiation of the atmosphere through the products of combustion. Illuminating gas is extensively used in heating and cooking. See Acetylene; Natural Gas.

Gaskell, Elizabeth Cleghorn (1810-1865), an English novelist, born in London. In 1832 she married William Gaskell, a Unitarian minister of Manchester. She is best known for her *Cranford*, a delightfully humorous idyl of English village life which has become a classic. Other writings of hers deal with moral

and social problems. She wrote *Ruth, North and South, Cousin Phillis* and the admirable biography, *Life of Charlotte Brontë.*

Gasoline, an inflammable liquid obtained in the distillation of crude petroleum, and from natural gas. It is colorless, exceedingly volatile and has a disagreeable odor. The vapor of gasoline when mixed with air is highly explosive, and when confined and ignited expands with sufficient force to overcome great resistance. This property of gasoline makes it a valuable source of power. Its greatest use is in operating gasoline engines. It is also used in stoves constructed especially for it, in cleaning clothing and for various other purposes. Gasoline should never be exposed to the air in a room where there is a fire or where a light is burning, and it is unsafe to use it near a hot iron or any other heated body. See GAS ENGINE; PETROLEUM; NATURAL GAS.

Gasoline Engine. See GAS ENGINE.

Gaspee, Affair of the, the destruction of the eight-gun British schooner *Gaspee,* off the coast of Rhode Island, June 17, 1772. The *Gaspee* was stationed in Narragansett Bay to enforce the navigation laws. The people of Rhode Island complained of the outrages perpetrated by the *Gaspee,* but affairs continued until the night of June 16, when she was run aground, on what has since been called Gaspee Point, while pursuing an American ship. The following night eight boats filled with men from Providence attacked and captured the *Gaspee,* and, her crew having been set ashore, she was burned to the water's edge. The British ministry ordered that the offenders be sent to England for trial; but Chief Justice Stephen Hopkins of Rhode Island refused to have anyone in his jurisdiction arrested for that purpose.

Gas'tric Juice, a colorless, watery fluid secreted by the stomach and aiding in the process of digestion. It is composed of hydrochloric acid, rennin and pepsin. By action of the stomach, food is thoroughly mixed with the juice and is reduced to a creamy pulp called chyme. It is then ready to pass on to the intestine. The amount of gastric juice secreted daily varies, but it has been estimated to be 14 lb. in the adult. It is continually being reabsorbed and does not accumulate in large quantites. See DIGESTION.

Gastri'tis, a general term including all inflammatory diseases of the stomach. The inflammation of the mucous membrane causes fever, headache and nausea. The stomach should be washed with a tube or pump and rested for about three days. Toxic gastritis, caused by certain poisons, is a very serious disturbance, and purulent gastritis is fatal. Sufferers from chronic gastritis may live for years with proper treatment and care.

Gates, Horatio (1728-1806), an American general of the Revolutionary War, born in Essex County, England. He entered the British army, soon became a major and, in 1755, was stationed at Halifax. He was captain of infantry under Braddock when that general was defeated near Ft. Duquesne, 1755, and, after a visit to England in 1763, he located on his estate in Virginia, where he remained until the opening of the Revolutionary War. On the recommendation of Washington, Congress then appointed him adjutant-general with the rank of brigadier. The following year he had command of the troops which were to move against forts Ticonderoga and Crown Point, and, early in 1777, he became head of the Northern army. In this position he won his great victory over the British general, Burgoyne, at Saratoga. The chief credit for Saratoga is due to Schuyler, Arnold and Morgan rather than to Gates; nevertheless, he was soon made head of the board of war, a position second alone to that of commander-in-chief of the army. He received chief command of the Southern army on June 15, 1780, after the capture of General Lincoln. Because of his signal defeat at Camden, he was superseded by General Greene. A court-martial followed, but Gates was acquitted and reinstated, 1782, after Cornwallis had been captured. For the next seven

years he lived in Virginia. He then freed his slaves and moved to the vicinity of New York City, and in 1800 became a member of the State Legislature. See CONWAY CABAL.

Gates, Sir Thomas (flourished 1596-1621), the first regularly established colonial governor of Virginia under the Virginia Company, born, it is believed, in Devonshire. He was trained for the army and came with Sir Francis Drake to America in 1585. After seeing service in many countries he became one of the petitioners for the royal consent to the establishment of a colony in Virginia, and in 1609 he sailed for America again, this time in command of nine vessels filled with colonists for the Virginia settlement. His own ship was wrecked, but after several months he succeeded in reaching Jamestown, where he was duly installed governor. The colony was in desperate condition; the colonists, hopeless and with barely enough to keep them from starvation, urged that they be taken to England. In response to their urging Gates embarked with them upon four small boats, but before reaching sea he was met by Lord De La Warr and returned. De La Warr was then made governor and Gates was sent to England for supplies. A year later he returned with more colonists and with cattle, seed and provisions. He was lieutenant-governor of the colony until 1614, and later served in various public positions connected with the colony.

Gath, one of the five cities of the Philistines, which were presided over by princes or lords. David found in it a temporary refuge at the time of his persecutions by Saul, and later, when king, he established his supremacy over it. Its site cannot be determined with certainty, but it is thought by some to be midway between Ekron and Ashdod.

Gatineau, *Gat″e″no′,* a river of Quebec and one of the chief tributaries of the Ottawa. It rises in the north-central part of the province and flows southward through several lakes, entering the Ottawa about a mile east of Ottawa City. It is fully 400 m. in length and is important as a logging stream.

Gatling, Richard Jordan (1818-1903), an American inventor, born in Hertford County, N. C. He showed mechanical genius while still young, assisting his father in making a cottonseed sower. Later he invented machines for sowing rice and wheat, a steam plow and a machine for breaking hemp. But the invention that has made him famous is the gun bearing his name, invented in 1862. In 1886 he invented a new gun metal. His experiments demonstrating the efficacy of his new method of casting cannon brought him an appropriation of $40,000 from the Congress of the United States.

Gatling Gun, a machine gun invented by Dr. R. J. Gatling of Indianapolis, Ind., in 1861. This gun consists of a cylinder of barrels, usually ten, fastened to a central shaft, and made to revolve by means of a crank. The feed case presents the cartridge to each barrel in turn. There have been numerous improvements, particularly in the feed case, since its invention, so that the gun fires 20 rounds per second. The Gatling gun is in use in the United States service. See ARTILLERY; MACHINE GUN.

Gauge, *Gaje,* in mechanics, an instrument by which dimensions, quantity, force, capacity, etc., are indicated. Gauges are used to secure precision of form and dimensions in manufacturing and usually consist of hardened steel. Circular disks, having around the edge a series of notches of different sizes corresponding to sizes of Birmingham wire, are used to measure wire and the thickness of plates. See MICROMETER.

A pressure gauge measures the force of water, steam, air, gas, etc., in closed vessels, and consists of a cylindrical metal box with a graduated dial, over which moves a pointer actuated by a spring, which, being compressed more or less by the force of water or steam, indicates on the dial in pounds and fractions thereof the pressure exerted. A water gauge consists of a strong glass tube set vertically, with its ends having metal connec-

tions to the boiler for the purpose of showing the height of water in the boiler. Gauge cocks are used for the same purpose in order to verify the level of the water. See BOILER.

Gaul, a name once given to two districts inhabited by tribes of Celts and known respectively as Cisalpine Gaul and Transalpine Gaul. The first included that part of northern Italy lying between the Alps and the Apennines, and the latter, larger and more important, embraced what is now France and Belgium and parts of Holland, Germany and Switzerland.

Cisalpine Gaul was conquered by the Romans in 222 B. C. and became practically Roman in its civilization. About 52 B. C. it was united with Italy and is now remembered for its gifted men, Vergil, Catullus, Livy, Pliny, Nepos and others, and for the excellent soldiers furnished to the campaigns of Cæsar and of Octavius. Transalpine Gaul, or Gaul, is heard of in connection with Roman history about 220 B. C. The first authentic mention is that found in the familiar passages of Cæsar's *Commentaries* where it is described as being divided into three districts differing from each other in language, customs and laws. The people of these sections were respectively: the Aquitani, who lived in the country extending from the Pyrenees to the Garonne; the Celts, who occupied the territory bounded by the Seine, the Marne, the Rhine and the Garonne; and the Belgæ, who occupied the remaining territory from the Rhine and the Seine to the mouth of the former. The migrations and incursions of these people upon the Roman Empire were practically unchecked until about 200 B. C., when the Gauls were made to submit most unwillingly to Roman rule. They continued Roman until 407 A. D., when the Franks and the Vandals overran Gaul and the power of Rome weakened as the kingdoms of the Visigoths, the Burgundians and the Franks were formed. A Roman general with Roman troops was still stationed in Gaul until 486, when Clovis drove out the last vestige of Roman power and Gaul itself ceased to exist.

Gaunt'let, or **Gantlet,** a kind of glove worn by the knights of the Middle Ages. It was made of leather and covered with irons, so put together as to admit of a free movement of the hand, and with a broad protective extension over the wrists. To throw down the gauntlet was to declare a challenge. A style of heavy glove with broad wrist covering, worn at the present time by equestrians, is also called a gauntlet.

Ga'vial, a member of the Crocodile Family, found in India, along the shores of the Ganges and Brahmaputra rivers. It is the largest of present-known Reptiles, often becoming 30 ft. in length, and is among the last of the once common, huge Reptiles of earlier eras. Like all crocodiles the gavial is both terrestrial and aquatic in its habits. It differs from other members of the family in having long, narrow jaws and a peculiar outgrowth at the extremity of the upper lip. In spite of its size the gavial is timid and takes to the water upon the slightest disturbance; for so large an animal it is exceedingly active both in and out of the water, where it readily catches its prey, consisting of frogs and fishes.

Gay, John (1685-1732), an English poet and dramatist, born in Devonshire. He wrote popular farces and comedies, among which the *Beggar's Opera* became the most famous, but his keen satires on society and government caused contemporary unpopularity. His *Fables* are original, lively and never strained. His song, *Black-Eyed Susan,* is a poem of genuine merit. He also published *The Present State of Wit, The Fan, The Shepherd's Week, What-d'ye-Call-It* and *Three Hours after Marriage.*

Gay-Lussac, *Ga"lu"sak',* **Joseph Louis** (1778-1850), a famous French scientist. On graduating from the Polytechnic School, Paris, he there became assistant chemist and subsequently professor of chemistry. Among many others he made the valuable discovery that two parts of hydrogen and one of oxygen unite to form water, and this led to the important

discovery of the law of volumes. Gay-Lussac applied his theoretical knowledge to various practical purposes, and his reward came in the form of high honors and prominent educational and governmental positions. In 1839 he became a French noble.

Gay'nor, William Jay (1851-1913), an American lawyer and statesman, born in Oneida Co., N. Y., and educated at Whitestone Seminary and in Boston. While receiving his legal training he worked upon several New York newspapers and was admitted to the bar of the state in 1875. His name has been prominent in many important cases, and his reputation became established through his work in breaking up political rings and disclosing election frauds. He was judge of the Supreme Court of New York for two terms, beginning in 1893, and was elected mayor of New York in 1909. He twice declined the Democratic nomination for governor of New York and also refused other public offices. He wrote freely upon legal subjects, was a prolific letter writer and was well known as a public speaker. He was friendly and sympathetic in temperament, being especially known for his interest in the welfare and activities of the city's children.

GAZELLE

Gazelle, *Ga-zel'*, an exceedingly graceful animal of the Bovine Family and related to the antelopes. It is found in Egypt, Arabia and Syria, where herds of the timid creatures may be seen in summer haunting the oases or skimming the ground in their rapid flight. Their skin is glossy and, in color, is a soft yellowish-brown upon the head and back, but pure white underneath and inside the legs. The mild, black eyes are very beautiful and are to the Orientals the basis of many an extravagant simile. Both sexes bear horns, which extend back in a graceful curve; the bones are small and slender and the hoof is especially shapely. The flesh of the gazelle is enjoyed by Eastern peoples, but the wild gazelle is difficult to secure, since in speed it outranks the greyhound and can be captured only by stratagem. Gazelles taken young are easily tamed and become playful and interesting pets.

Geary, *Gar'y,* **John White** (1819-1873), an American soldier and governor. He served in the Mexican War, becoming colonel and first commander of the City of Mexico. Afterward he was first mayor of San Francisco and, in 1856, territorial governor of Kansas, where he soon had order. He resigned, however, the following March, because of lack of Federal support. During the Civil War he fought at Cedar Mountain, Chancellorsville, Gettysburg and Lookout Mountain, and marched with Sherman to the sea. Later, he was military governor of Savannah, was brevetted major-general and was twice elected governor of Pennsylvania.

Geck'o, a family of lizards, made up of nearly 300 species, the most of which are found in southwestern United States. The gecko has a flat head, thick body and short tail. Members of the family are particularly distinguished by the round suckers upon each toe, by means of which they are enabled to run over smooth walls and walk upon ceilings like the fly. They have a beaded, toadlike skin and, generally, no eyelids, though their eyes are protected by a thin film, like a tiny watch crystal. The gecko is the only lizard which can make any audible sound except a hiss, and its one cry consists of a clicking sound supposed to be imitated in its name. The largest specimens attain a length of 14 or 15 inches, but all are harmless.

Geikie, *Gee'ky,* **Sir Archibald** (1835-), a British geologist, born in Edinburgh, Scotland, and educated in the University of Edinburgh. In 1855 he be-

came a member of the Geological Survey of Scotland and later its director-general. He served for 11 years as Murchison professor of geology and mineralogy in Edinburgh University, and then was made director of the Museum of Practical Geology in London. Later he was chosen president of the Geological Society of London, and also of the British Association for the Advancement of Science. He visited the United States in 1897 and lectured at Johns Hopkins University. Geikie is one of the best authorities on geology, mineralogy and physiography, and has written extensively on these and kindred subjects. He has been honored by various universities and societies. Among his books are *The Story of a Boulder, Text-Book of Geology, Field Geology, Class-Book of Geology, The Ancient Volcanoes of Britain* and several biographies.

Geissler Tubes, so called from the name of a well-known maker, are tubes of glass especially designed for showing the phenomena of electric discharge through rarefied gases. They are usually provided with aluminum electrodes, attached to platinum wires sealed into the glass and terminating outside. They are usually made large near the electrodes and narrowed to about a millimeter in diameter between, and are filled with air or other gas at a pressure of about one millimeter of mercury. When a discharge from an electric machine or an induction coil is sent through them, they exhibit very beautiful illumination, which often appears stratified, especially in the narrow part of the tube where it is the most brilliant. The color of the light depends upon the gas used: air shows reddish-violet; carbon dioxide, a pale white; and hydrogen, a blue.

Gelatin, *Jel' a tin,* a yellowish, hard, transparent material obtained chiefly from animal tissues, especially bones. It is an animal glutin produced when bones are treated with dilute muriatic acid, which dissolves the phosphates and carbonates and leaves behind the bone cartilage. When this is boiled in water for a considerable time, it dissolves and forms gelatin. In its crude condition gelatin is used as a glue. It is purified by dissolving in hot water and adding alcohol to the solution, which causes the impurities to settle to the bottom of the vessel. The purest and best gelatin is produced from the bladder of the sturgeon. A cheap article is obtained by boiling under pressure horns, hoofs and hides of animals. When pure, gelatin is a yellowish-white, transparent substance without taste or smell, and is insoluble in alcohol or ether but soluble in hot water. When heated dry in retorts, gelatin gives out a number of chemical substances. When put in cold water it becomes a transparent mass, and in this shape is used to make jellies. Gelatin is easily digested and absorbed and is therefore used as a food for invalids, also as a basis for training diets, but as a builder of animal tissues it has no value whatever. Gelatin is largely used in taking impressions and casts for making models of type. It is one of the ingredients of printing-press rollers, and is employed in dyeing and tanning, and as a size in paper making and painting. In medicine it is employed in making capsules and in coating pills. Gelatin-coated glass plates or films are used for dry-plate photography, and in making the films of moving-picture machines. See PHOTOGRAPHY; HALF TONE; MOVING PICTURES.

Gemini, *Jem' i ni,* the third constellation of the zodiac, also one of the signs of the zodiac, but the constellation is not now in the sign. Gemini takes its name from two bright stars, Castor and Pollux. The sun enters Gemini about May 21 and leaves it about June 21. The sign is ♊.

Gems, Artificial, a general term applied to imitations of precious stones. The art of making artificial gems was known to the ancients. Pliny and Seneca mention the making of artificial opals and emeralds, and it is known that the hyacinth, ruby, sapphire and topaz were made in the 12th century. The Egyptians made excellent imitations of precious stones by coloring glass, while the Romans used rock crystal in imitating

gems. The medieval alchemists produced some excellent artificial gems, like the ruby, sapphire and topaz, by chemical means. Diamonds have been made artificially by Moissan, a Frenchman, by fusing carbon at a very high temperature in an electric furnace and with molten iron as a solvent, but the gems were too small and the cost too great to make their manufacture a commercial success. Rubies also have been made by fusing corundum with metallic oxides.

A glass known as paste or strass, composed of powdered quartz, red lead and dry potassium carbonate, is commonly used in making artificial diamonds and other gems. This glass is remarkably clear and brilliant, and it is colored to imitate the various artificial stones in the same manner that ordinary glass is colored (See GLASS). Imitation pearls are made by coating the inner surfaces of hollow glass beads with a paste made from the powdered scales of certain fishes. Colored varieties of quartz are often substituted for other gems; for instance, the yellow varieties, known as cairngorm and citrine, are sold as topaz, while the purple varieties are offered as the Oriental amethyst. By the application of heat to certain gems they are rendered colorless and their brilliancy is increased. In this way the topaz and sapphire are treated and sold as diamonds.

A doublet is composed of a thin plate of a genuine precious stone cemented to a cheap stone as a backing. Sometimes great brilliancy is obtained by combining colored stones in the form of a doublet. Many cheap imitations of diamonds are simply quartz set in a backing of tin foil, and sometimes the white Brazilian topaz and many colorless varieties of the sapphire and emerald are shown as diamonds. Imitation and artificial gems are now so skillfully prepared as to deceive even dealers in them, and the best protection is to purchase only from reliable firms who employ experts.

Gemsbok, *Gemz' bock",* the largest and most beautifully marked of the gazelles and, like all gazelles, a member of the Bovine Family. Its head bears two straight, slightly diverging horns from two to two and a half feet in length. These are its means of defense. The gemsbok is a heavy animal and keeps to the open plains of southern Africa, where it ranges in groups or families of five or six. In color the body of the gemsbok is reddish-gray, a color which continues to its knees and there changes suddenly to a clear cream-white. The gemsbok is variously called oryx, oryx gazelle and kookaam. In some localities the male chamois is called the gemsbok.

General Education Board. This board was established by John D. Rockefeller, incorporated in 1902 and chartered by act of Congress in 1903. To the original fund of $1,000,000, Mr. Rockefeller added $10,000,000 in 1905 and $32,000,000 in 1907. The board is now carrying on three lines of work: (1) the promotion of practical farming by both whites and negroes in the Southern States; (2) the development of a system of public high schools in the Southern States, which former President Eliot of Harvard, after personal inspection, declared "is the most valuable piece of constructive educational work now going on in the United States;" (3) the promotion of higher education throughout the United States. In promoting agriculture, disbursements are made through the United States Department of Agriculture. In working for the establishment of high schools, the board furnishes the funds by which state universities may bring a knowledge of the existing needs to the attention of the people. Prior to 1910, this had resulted in the establishment of more than 700 high schools and an investment by the public of some $6,500,000. In aiding colleges and universities upwards of $6,000,000 was contributed before 1910, to supplement donations of $18,000,000 from other sources.

Gen"esee', a river of eastern United States, rising in north-central Pennsylvania and flowing north through New York into Lake Ontario, 7 m. north of Rochester. Through 20 m. of its extent

it has cut a deep gorge in the sandstone rocks, and the cliffs in many places have a perpendicular height of 350 ft. Within the gorge the river has three cascades, one of which has a fall of 110 ft. The falls at Rochester furnish the city excellent water power. The Valley of the Genesee is one of the most fertile parts of New York. The river is about 140 m. in length.

Genesis, *Jen' e sis,* the first book of the Bible and of the Pentateuch. The name is derived from a Greek word signifying to beget or to be born, and was applied by the Greek translators. *Genesis* is thus aptly named, for it gives the *origin* of the material universe, of man, of sin and salvation, and, more particularly, the origin of the Hebrew nation. The book consists of two great divisions: the first part gives the history of the creation of the human race to the call of Abraham, including the fall of man, the flood and the dispersion of the human race; the second is the history of Abraham and of the other Hebrew fathers to the death of Joseph.

Genet, *Zhe neh',* **Edmond Charles Edouard** (1765-1834), a French diplomat, born in Versailles. He was attached to the French embassies at Berlin and Vienna before 1781, in which year he succeeded his father as chief of the bureau of correspondence in the department of foreign affairs. Later he was in service in St. Petersburg. During the Revolution, Genet allied himself with the Girondists, and, following a short commission in Holland, he was appointed minister to the United States, arriving at Charleston, S. C., in April, 1793. Immediately he set about securing recruits for the conquest of Louisiana; but when he commissioned privateers from American ports to aid France in her trouble with Great Britain, President Washington and Secretary of State Jefferson warned him to desist, for the United States had determined on neutrality. Genet, however, continued to act so imprudently that, in 1794, Washington demanded his recall. Fearing to return to France, Genet became a naturalized citizen and settled in New York, where he married the daughter of Governor Clinton.

Geneva, *Je ne' va,* a city of Switzerland, capital of the canton of the same name, situated at the southwestern extremity of the country and of Lake Geneva. Beyond the city to the south extend the valleys of the Arve and the Rhône; in the distance towers the snow-capped Mont Blanc. The important buildings include the Cathedral of St. Pierre, the town hall, the Conservatory of Music, Victoria Hall, the university and several museums. The largest industries are watchmaking and the manufacture of jewelry. Fairs are held four times a year, at which Swiss, French and Italian merchants bargain over the staples, consisting chiefly of cloth, wine, silk, timber and groceries. A popular entrance to Switzerland for tourists is by way of Geneva. Although the canton is the smallest in the Swiss Confederation, it has given to the world a surprisingly large number of famous men. Population in 1900, 104,796.

Geneva, N. Y., a city of Ontario Co., 52 m. s.e. of Rochester, at the north end of Seneca Lake, on the Seneca & Cayuga Canal and on the Lehigh Valley and the New York Central & Hudson River railroads. The city is attractively situated and commands a beautiful view of the lake and adjacent country. There are good mineral springs, and the city is noted for its extensive nurseries and greenhouses. Geneva is the seat of the New York State Agricultural Experiment Station and of Hobart College (nonsectarian), founded in 1822 as Geneva Academy and renamed in 1860 in honor of Bishop John Henry Hobart. The William Smith Women's College was endowed in 1906 by William Smith of Geneva, who also maintains the Smith Observatory, which was built in 1888.

Geneva has important manufactories of steam boilers, motors and motor boats, canned goods, cereals, stoves and ranges, cutlery, optical goods, wagons, wall paper and tin cans. The city also contains a hygienic institute, city hos-

pital, a public library, good municipal buildings and numerous churches. The water supply system is owned by the city. The first settlement was made in 1787 near the site of Kanadesaga, an Indian village which was destroyed by Gen. James Clinton in 1779 during General Sullivan's expedition against the Indians. Geneva was granted a city charter in 1898. Population in 1920, U. S. Census, 14,648.

Geneva Award. See ALABAMA CLAIMS.

Geneva, Lake of, or **Lake Leman,** the largest lake of Switzerland, lying in crescent form upon the southwestern border between Italy and the Province of Vaud. It is formed by the Rhône, which enters at the eastern extremity and flows out at the western, where the city of Geneva is located. The length along the axis is 45 m. and its area is 225 sq. m.; its greatest depth is 1015 ft., but the average depth is 500 ft. Lying in the clear, cool atmosphere of the mountains 1150 ft. above sea level, the water is of beautiful blue color, and the scenery about its shores attracts numbers of tourists.

Genghis Khan, *Jen' giz Kahn'* (1162-1227), a celebrated Mongol conqueror. He was the son of a Mongol chief who paid tribute to the ruler of East Tartary, and succeeded his father in the government when only 13 years of age. He soon showed notable qualities of leadership and after much warfare was proclaimed khan of the united Mongol and Tartar tribes. Among his later exploits were the subjugation of China and the capture of Peking, that city being stormed and plundered in 1215. Subsequently he invaded Turkestan, and before his death his empire extended from the Pacific Ocean to the Dnieper River in Europe. At his death his empire was broken up, the largest division being the present China.

Genii, *Je' ni,* according to ancient Roman belief, spirits who were protective rulers of the lives of men and responsible for them. The corresponding tutelary spirit of woman was called her Juno. Offerings were made to genii on birthdays.

Gennesaret, *Jen nes' a ret,* Lake of. See GALILEE, SEA OF.

Genoa, *Jen' o a,* a seaport of northern Italy, capital of the province of the same name, situated on the coast of the Mediterranean at the foot of the Ligurian Alps. It is fortified by a surrounding wall, and this confinement has made it a city of narrow, crowded streets and alleys. Stairways facilitate ascent of the hills, and bridges span the valleys. The streets and avenues of the newer quarters are broad and attractive, and there are several beautiful gardens and parks. The chief buildings are the Cathedral of San Lorenzo, the Church of San Ambrose and San Andrew, several palaces of the Genoese patricians, the university established in 1471, the large asylum for the poor, the Verdi Institute of Music, the municipal library and the Academy of Fine Arts. The trade of Genoa is facilitated by an enlarged harbor and several tunnels, but the railway accommodations remain poor. The industries represented are shipbuilding, cotton spinning and weaving, sugar refining, tanning, and the manufacture of cement, macaroni, and like products, crystallized fruits and filigree silverwork. It is thought that the Greeks occupied Genoa in the fourth century B. C. In 1815 it was incorporated with the Kingdom of Sardinia. Population, 300,000.

Genoa, Gulf of, a part of the Mediterranean Sea. It lies near the city of Genoa and is partly surrounded by the coast extending from Oneglia to Spezia.

Genseric, *Jen' ser ik,* a King of the Vandals who flourished in the latter part of the fourth and the early part of the fifth centuries A. D. After the death of his brother Gonderic, Genseric became sole ruler, and in the year 429, with an army of 50,000 men, crossed the Straits of Gibraltar to assist Boniface, Roman governor of Africa, in an expedition against the Moors. After assisting Boniface, Genseric conquered him and set up an independent kingdom at Carthage in 439. In 455 he captured Rome, and

his barbarians destroyed the city. Genseric died in 477 still in possession of all his conquests, the greatest Vandal of the Vandal kings. See VANDALS.

Gentian, *Jen' shan,* an autumn-blooming plant of the Gentian Family. It grows chiefly in woods or damp places. The fringed gentian, which is the most beautiful species, is an annual herb, bearing narrow, opposite leaves on the almost square stems. The flower is a deep violet-blue in color and has a paler purple tube, from which the four fringed lobes spread flatly. The other gentians are more intensely blue in color but less graceful in form.

The downy gentian has not the flattened lobes, but instead has five sharply-pointed divisions which open only a short distance. The bottle, or closed, gentian seldom opens at all, but is deeply fringed. This is sometimes found in white or white-lined variations. These gentians are found chiefly in dry hillsides or pine barrens in the North, West or South. The soapwort gentian is found in more marshy localities, principally in the North. The blue gentian is the state flower of Wyoming.

Bryant's *To the Fringed Gentian* and Emily Dickinson's *The Fringed Gentian* aptly characterize the species named.

Genus, *Je' nus.* See BOTANY, subhead *Classification.*

Geodesy, *Je od' e sy,* the study of measurements on the earth's surface which are of such length that the earth must be considered as a sphere. The principles and formulas of spherical trigonometry are made use of, and the instruments employed are the same as those used in surveying. The measurements taken are used in making maps of continents or other large areas.

When Newton announced the law of gravitation and advanced the consequent theory that the earth is flattened at the poles, geodetic surveys were sent out to take measurements of an arc near the equator and of one in polar regions. The result was not only vindication of Newton's theory, but also the beginning of modern geodesy. Practical geodesy is at present engaged in the measurement of geodetic arcs necessary in the preparation of survey maps. Two of these arcs have been completely measured and a third practically so in the United States, by the United States Coast and Geodetic Survey.

Geoffrey, *Jef' ry,* of Monmouth (about 1100-about 1154), a Welsh historian, born at Monmouth, Wales. In 1152 he was consecrated Bishop of St. Asaph. He is remembered chiefly as author of a famous work in Latin, entitled *History of the Kings of Britain,* first circulated about 1139. The author relates the history of the kings of Britain from Brutus, great-grandson of Æneas, down to Cadwallader. Among the stories given is that of Lear, and the book is also one of the sources of the legend of King Arthur. See ARTHUR, KING.

Geographic Societies, scientific societies interested especially in advancing the knowledge of geography and in perfecting that science. The leading geographic societies in the United States are the American Geographical Society with headquarters in New York, which publishes the *Bulletin;* the National Geographical Society of Washington, D. C., which publishes the *National Geographic Magazine;* the Geographic Society of Chicago and those of Baltimore and Philadelphia. The Royal Geographical Society of London is the leading organization among societies of this class.

Geog'raphy, the description of the earth, or the science which treats of the earth as the home of man. Until comparatively recent times geography was confined to a mere description of the earth's surface, but it has now been developed into a science based upon principles and laws of its own. Geography now includes within its scope the distribution of all phenomena upon the earth's surface and the interaction between life and its environment, placing special emphasis upon the influence of environment on man. Geography draws upon geology for a knowledge of the earth's structure and the history of its

formation; upon botany for a knowledge of its vegetable life; upon zoology for a knowledge of animal life; and upon ethnology for a knowledge of the human race. Geography lies at the foundation of history, since all movements in human progress have been due primarily to geographic conditions. For convenience of study, geography is usually divided into four departments or divisions: (1) mathematical geography; (2) physical geography; (3) political geography; (4) commercial or economic geography.

Mathematical Geography. Mathematical geography treats of the form, size and motion of the earth, latitude, longitude and the change of seasons. It is sometimes called astronomical geography.

Physical Geography. Physical geography treats of the surface of the earth, the atmosphere and conditions pertaining to animal and vegetable life. See Physical Geography.

Political Geography. Political geography treats of man and his work and the political divisions. It is closely related to physical geography.

Commercial Geography. This division treats of industries and commerce, showing especially the conditions upon which the various industries depend and the causes for trade between nations. It is really a subdivision of political geography, but it has become so important that all recent authorities treat it as a separate department. See Earth; Ocean; Atmosphere; Wind; Rain; Currents, Marine; Seasons.

Geological Survey of the United States, a bureau of the department of the interior. Its function is to prepare maps of public lands; to classify these lands; to investigate the geological structure and mineral resources of the country; and to survey irrigable lands belonging to the government. For sometime previous to 1879 this work was carried on, to a certain extent, by four independent surveys working under the general government. In that year these organizations were consolidated and made a part of the interior department. The bureau is in charge of a director, who is required to submit an annual report of the plans and operations of the survey to the secretary of the interior. Pamphlets containing information as to the results of investigations are published from time to time, which the bureau distributes free of charge to all persons interested. Maps are also published and these can be obtained at small cost.

Geology, *Je ol' o jy,* the science which treats of the formation of the earth as revealed in the rocks. The history of the formation and development of the earth is written in the rocks constituting its crust, and it is the work of the geologist to read and interpret this history. The record is far from complete, and in this respect the geologist meets difficulties similar to those of the historian in deciphering an ancient manuscript who finds here and there a page missing. Again, in order to interpret this rock-written history, the geologist must bring numerous other sciences to his aid, especially botany, physics, chemistry, zoology and astronomy. With the aid of these he is able to compare the composition of the earth with that of other bodies in the solar system; to trace the evolution of plant and animal life through the succeeding geologic ages; and to determine the physical forces that have wrought the various geologic changes. In pursuit of their work, geologists are guided by two fundamental principles: (1) the age of the earth is very great; (2) in the processes and forces in operation at present, we may look for illustrations of most of the changes of the past.

Age of the Earth. Since the geological records are found only in the rocks, geology cannot scientifically account for the origin of the earth. Whatever is attempted toward the solution of this problem is speculative theory. But that the time which has elapsed from the formation of the oldest rock to the present is very long, there is abundant evidence. The following illustrations show how geologists arrive at this conclusion.

We see water wearing away the loose earth and carrying the particles down the streams to lakes and to the sea, where they form sediment on the bottom and gradually fill up the lake or make the gulf or bay more shallow. When first deposited, the sediment is soft mud; in the course of years it becomes harder, and possibly in a century or more it is changed to solid rock. There are extensive formations of this sort of rock and in some cases they are 40,000 ft. in depth, and even if the process in the past was much more rapid than now, it must have taken 100,000,000 years to build these rocks. There are also extensive formations of rock, consisting almost entirely of the fossils of minute animals, and when the slow growth of coral formations at the present time is considered, the conclusion is easily reached that the time required for forming these rocks is little, if any, less than that required for the other class. In tracing the evolution of plant and animal life from the oldest fossils, the same conclusion is also reached; namely, that the age of the earth is very great, so great in fact that it cannot be accurately estimated. Geologists, therefore, have given widely different estimates, ranging from 20,000,000 to over 100,000,000 years.

Geologic Forces. The forces which have caused geologic changes and are still causing them are air and water (See Erosion); gravity, chemical action and life. Chemical change is constantly taking place; rocks are being disintegrated and changed into other substances. We have already referred to the work of minute animals in forming rock, and wherever the coral polyp is found, rock is being formed in a similar manner. Plants also decompose rock and extract from its elements most of their food; that these forces operated in the past much more rapidly than they do now in the same localities, is seen by the extensive deposits of coal in the cool temperate regions, like the United States, Nova Scotia and Alaska. The fossils in these localities also tell us that at this time they supported plants and animals similar to species now found in the tropical waters.

Classes of Rocks. The rocks forming the earth's crust are divided into three classes according to their formation. These are:

Sedimentary, or those formed by the action of water, as described above. Sandstone arranged in layers and stratified limestone are good illustrations.

Igneous, or those formed by heat. The igneous rocks were once in a molten state and solidified. Most of them are crystalline. Quartz, granite and basalt are good examples.

Metamorphic, or those rocks formed by water and having their appearance and structure changed by heat. Marble and slate are the best illustrations of this class.

Arrangement of Formations. If the rocks had remained as they were formed, the oldest would be at the bottom and the most recent at the surface of the earth's crust. Such, however, is not the case. Repeated foldings and breakings of the earth's crust while cooling threw up high ridges, in some places forming mountains, and made deep depressions in others, forming valleys. In this way the layers of rock were folded and often broken, and in places molten matter was forced out and flowed over sedimentary rocks, thus forming igneous rock on top of them. In many places the older formations are on or near the surface, while those of more recent date are underneath. The relative ages of the strata are determined by their fossils; hence the practical geologist has little difficulty in determining the system to which any formation belongs, let its position be what it will.

Classification. The different formations follow the same order in Europe and America, and so far as known in the other continents. The fossils in each formation indicate the most important forms of animal and vegetable life during that period, and geologists have divided the earth's history into eras and systems. While the European and American classifications agree in the main,

they differ in minor particulars. The classification here given is that adopted by the United States Geological Survey.

Eras { World-wide systems of strata corresponding to periods of the same names, U. S. Geological Survey usage 1903.

Cenozoic { Quaternary / Tertiary

Mesozoic { Cretaceous / Jurassic / Triassic

Paleozoic { Carboniferous / Devonian / Silurian / Ordovician / Cambrian

Proterozoic: Algonkian

Azoic: Archæan

Divisions of Geology. The various lines of geological research have caused the science to be divided into a number of branches, the most important of which are:

Historical Geology, which gives an account of the development of the science from its earliest conception.

Geognosy, the division which includes the study of the substances of which the earth is made, as the rocky crust, the water and the atmosphere.

Dynamic Geology, which treats chiefly of the forces which cause and have in the past caused geologic changes.

Structural Geology, which investigates the structure of the earth's crust and tries to account for the causes which have placed the formations in their present position.

Physiographic Geology. This is also called *Surface Geology,* and is concerned with changes now taking place in the surface. It is practically the same as physiography.

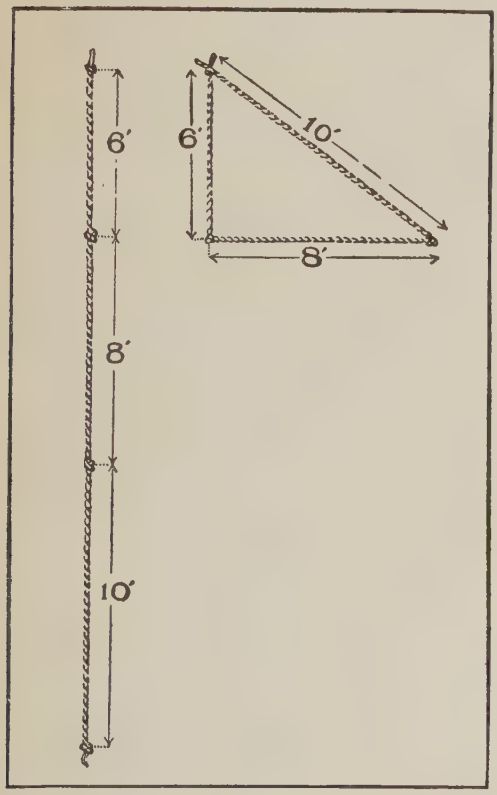
Economic Geology. This treats of economic phases, such as the location of ore deposits and of marble, slate, sandstone and other rock suitable for building or other purposes. Consult Heilprin, *The Earth and its Story;* Shaler, *Outlines of the Earth's History* and *Aspects of the Earth;* Tarr, *Economic Geography of the United States.* See Physical Geography; Mineralogy; Earth; Geyser; Volcano; Glacial Period.

Geometry, *Je om' e try,* the branch of mathematics which treats of extent as represented by solids, surfaces, lines and points and their relations to each other. It was called by the ancients a perfect science, since it is made up of statements of facts which are not only proved true in one instance but are true for all time. The laws of physics may be changed by the introduction of new forces and chemical experiments may fail through temporary changes of condition, but the statements of geometry are always true.

The name geometry is derived from two words meaning "to measure the earth" and the name indicates the possible beginnings of the science. When the annual overflow of the Nile washed away the artificial boundaries of a man's land and even changed the natural landmarks, a system of mensuration which included geometric computations of area were necessary to restore to each his own amount of land. The Pyramids, also, show that the Egyptians early knew the rudiments of geometry. The Egyptian communities included men professionally known as "rope-stretchers" who bore ropes divided by knots into three sections of six, eight and ten feet, respectively, or corresponding lengths. Their occupation consisted in the constructing of right angles by making of the rope a triangle whose sides of six and eight feet respectively would include a right angle, since the sum of the squares of these sides equaled the square of the third side.

The truth of this statement about the relation of the sides of a right triangle was not demonstrated, however, until the time of Pythagoras, whose name is still given to the theorem to which he gave the first proof. Plato, Aristotle, Archimedes and Euclid, also of the schools of Greek philosophers, discussed geometrical questions and organized the science. Euclid divided the subject into 13 books and preceded each by preliminary axioms and definitions. Euclid's plan was to

prove theorems only after the figure concerned was accurately constructed by means of the straight edge and the compass; the modern tendency is to assume that figures may be drawn or constructions made, and proofs are then sought for all assumptions that may be made. In many localities geometry is still spoken of as Euclid, though the name applies only when the old theory is assumed.



ROPE TRIANGLE

All mathematicians, Gauss, Legendre, Descartes, Helmholtz, Klein and those of distinctly modern times, have given great attention to geometry, but owing to the nature of the subject greater change has come about in the method of teaching than in the subject matter.

Geometry is divided into several departments: plane geometry, which deals with lines and angles lying in the same plane; solid geometry, which treats of constructions of three dimensions; higher geometry, which treats of conic sections, curved lines and bodies generated by means of curved lines; and analytic geometry, which makes use of the coordinates and the principles derived therefrom.

George, the name of several kings of Great Britain and Ireland, belonging to the House of Hanover. George I succeeded to the throne in accordance with the Act of Settlement of 1701, and was succeeded by his son, George II. Both of these kings were German and cared more for Continental affairs than for the interests of England. It was due to their indifference that cabinet government originated and gained so much power in the country.

George III (1738-1820), the grandson of George II, was born in London and received an English education. He became king in 1760 and the next year married Charlotte Sophia of Mecklenburg-Strelitz. George III was determined to recover the royal power lost by the indifference of the two former kings. The chief events of his reign were: the war by which the American colonies gained their independence; the formation of the Triple Alliance under the ministry of William Pitt and including Great Britain, Prussia and Holland; the war between England and France; the union of Ireland with England; the long war with France, ending with the Battle of Waterloo; and the beginning of colonization in Australia. During his last years George III was hopelessly insane.

George IV (1762-1830), the eldest son of George III. He became prince regent in 1811, and king in 1820. England was prosperous during his reign and held a high place in European politics. In 1829, on the strong representations of the Duke of Wellington, the King withdrew his opposition to Catholic Emancipation.

George I (1845-1913), the second son of Christian IX of Denmark, and King of Greece from 1863 to 1913. He was elected king by the National Greek Assembly after the deposition of Otho, and

began to reign on Oct. 31, 1863. Under his democratic rule Greece advanced rapidly. The King took an active interest in the development of the army, which he brought to a high degree of efficiency. Greece bore a prominent part in the Balkan War which broke out in 1912, and after the capture of Saloniki, Turkey, King George made that city his place of residence. Here, on March 18, 1913, he was assassinated by an anarchist. He was succeeded by his son, Constantine I, the commander of the Greek forces in the Balkan War. The Queen Dowager, Olga, is the niece of the former Czar of Russia, Alexander II.

George V (1865-), King of England from 1910. He was the second son of King Edward VII and, with his elder brother, began his education under a tutor in Sandringham. Later he became a naval cadet and spent several years cruising, advancing through the posts of sublieutenant and lieutenant to the final position of commander of H. M. S. *Thrush*. Upon the death of his brother, the heir apparent, he left the navy to devote himself to the preparation of his later duties. In 1893 he married Princess Victoria Mary, daughter of Francis, Duke of Teck. When his father ascended the throne, he became Duke of Cornwall, and soon afterward, with Princess Mary, he made a tour of the colonies, stopping in Australia to open the first Parliament of the new Commonwealth of Australia. Though a student and fond of a quiet life, King George has shown himself a practical and progressive ruler, interested especially in the organization and development of Britain's colonial possessions. Edward Albert, the eldest son and heir apparent to the throne, was born June 23, 1894.

George, Henry (1839-1897), political economist, born in Philadelphia, Pa. A seafaring life was planned for him, but when he arrived at California, instead of going to sea he found employment as a printer, and later became interested in social and political subjects, and was one of the founders of the *Post* of San Francisco. In 1876 he was made state inspector of gas; and three years later he published his book, *Progress and Poverty*. He moved to New York in 1880. In 1881 he visited Europe, and subsequently made several other visits both to the British Isles and to the Continent. In 1886 he was nominated for mayor of New York by the Union Labor Party, but failed of election. He established the *Weekly Standard*, of which he continued to be the editor until 1890. Mr. George also lectured extensively on political economy. He was one of the chief promulgators of the single-tax theory, and also the author of several books on political economy. Among them may be mentioned the *Land Question, Social Problems* and *Protection or Free Trade*. See TAX, subhead *Single Tax*.

George Eliot. See ELIOT, GEORGE.

George Junior Republic, an industrial institution near Freeville, N. Y. It is a republic in miniature, with boys and girls as citizens, and in its organization it resembles the United States Government, with executive control vested in three departments, the legislative, the judicial and the executive. It was founded July 10, 1895, by William Reuben George of New York City. For four years he had been in charge of the children's summer outings arranged by the New York *Tribune*, and during this time he had become interested in methods of conducting charities which would do away with the danger of pauperization and indiscriminate giving.

He experimented for some time with trial communities, and a permanent colony was finally established. The aim of the George Junior Republic is clearly indicated by its motto, "Nothing without labor," which has become the guiding principle of all the members of the community. About 225 children are in attendance. They are dependents or delinquents, many of them, and are gathered chiefly from the poorer districts of the large cities throughout the country. The entrance age varies from 12 to 18 years, and already at this early age many

GEORGE V, KING OF GREAT BRITAIN

have manifested marked criminal tendencies. The method of dealing with these children is one of reform through labor. Opportunities for choosing an occupation are provided and diligent application to his chosen task is required of each child. Carpentry, plumbing, printing, farm work, blacksmithing, domestic service, sewing, cooking and laundry work represent the chief activities. Attendance in school is compulsory for children under 16 years, and a high school course prepares those who desire entrance to college.

The citizens reside in cottages. Other buildings in the community are a schoolhouse, a library, a store, a bank, workshops, restaurants and hotels. The average age of the children in residence is about 17. Mr. George acted as president during the first year, but in 1896 this privilege was transferred to the citizens. The right of suffrage is granted to all, but children under 15 years of age are placed in the charge of an older resident. By this method of self-government, each child is taught the principles which govern a self-controlled and moral life.

Since the establishment of this community, several other organizations with similar aim and scope have been formed. The Carter Junior Republic at Readington, Pa., and the National Junior Republic near Annapolis Junction, Md., are models of the George Junior Republic. In 1908 the National Association of Junior Republics was formed. The president was Mr. George, and the purpose of the association was the supervision of the establishment in each state of the Union of at least one republic modeled on the government of the state in which it is found. Republics are now in existence at several places.

George, David Lloyd. See LLOYD, GEORGE DAVID.

George, Saint, the patron saint of England, Genoa and Russia. His life is so obscured by legend that it is difficult, if not impossible, to be sure even of his identity. But the probabilities seem to be that he was born of Christian parents of Cappadocia, and became a soldier and the patron saint of soldiers. He is also the patron saint of chivalry. It is related that he once slew a dragon who was about to capture and devour a royal lady of charming beauty. St. George's Day in England was fixed, in 1222, as the 23rd of April, to be observed as a national holiday. In 1350 he was made patron of the Order of the Garter by Edward III. The red cross of St. George is on the white background of the Union Jack of England.

George Washington University, at Washington, D. C. (1821). Chartered as Columbian College, and in 1874 as Columbian University, the institution has borne its present name since 1904. It is nonsectarian and coeducational. Its library of about 35,000 volumes is supplemented by some 34 governmental libraries of the city, which contain more than 2,000,000 bound volumes. Students also have access to the numerous, extensive and valuable collections in the museums of the city, and enjoy certain advantages obtainable only at the capital of the nation. The university offers courses for undergraduates in Washington College of Engineering, in Columbian College and in the National School of Pharmacy; it also maintains graduate courses and departments of law, jurisprudence and diplomacy, medicine and dental surgery. The enrollment includes some 250 women and about 1200 men.

Georgia, THE EMPIRE STATE OF THE SOUTH, one of the South Atlantic States, is bounded on the n. by Tennessee and North Carolina, on the n.e. by South Carolina, on the e. by the Atlantic, on the s. by Florida and on the w. by Alabama. The Chattahoochee River forms about one-half of the western boundary.

SIZE. The length of the state from north to south is 320 m. The breadth is 254 m. and the area is 59,265 sq. m., of which 540 sq. m. are water. Georgia is the largest of the South Atlantic States, a little larger than Florida, about the size of Illinois and Delaware combined

and a little larger than England and Wales, and the 20th state in area.

Population. In 1920 the population was 2,895,832. From 1910 to 1920 there was a gain in population of 286,711, or 11.0 per cent. There are 49.3 inhabitants to the square mile and the state's rank in population is 12.

Surface. Extending inland from the southern coast is a great plain known as South Georgia and having an area of about 35,000 sq. m. This plain extends northward to the Fall Line, which passes through Augusta, Milledgeville and Macon, reaching the western boundary at Columbus. Along the coast and about 20 m. inland the elevation does not exceed 10 ft., but as we go westward and northward the surface rises until at the Fall Line it has an altitude ranging from 500 to 600 ft. In the southeastern corner of the state is the Okefenokee Swamp, part of which is in Florida.

That portion of the state north of the Fall Line is known as North Georgia. It is divided into four surface regions, each having distinct characteristics. The first of these is the Piedmont Plateau, which extends from the Fall Line to the Blue Ridge Mountains. This region is characterized by low hills separated by valleys formed by erosion. The next division is the Blue Ridge Mountain region. This range of mountains crosses the state from northeast to southwest and forms one of its most striking physical features, though the mountains are not so high here as in Virginia and North Carolina. Beyond the Blue Ridge is the Appalachian and Great Valley region, characterized by parallel ranges of low mountains separated by deep valleys. In the extreme northwest is a part of the Cumberland Plateau containing Lookout and Sand mountains, the former lying partly in Tennessee.

Rivers. Georgia is divided into three drainage areas. The eastern part of the state is drained into the Atlantic Ocean. The principal rivers from north to south are the Savannah, which forms the boundary between Georgia and South Carolina; the Altamaha, formed by the Oconee and the Ocmulgee and having the Ohoopee for its tributary; and the Satilla, which is in the southeast corner of the state. The Chattahoochee, southeast of the Blue Ridge and parallel to the mountain range, drains the north-central part of the state into the Gulf of Mexico. Its chief tributary, the Flint, drains the central part. The southern part of the state is drained by the Allapaha and the Ocklockonee. A small section of the northwest is drained into the Tennessee, and the Great Valley is drained by the Coosa, which flows into the Alabama.

Scenery. Northern Georgia presents a beautiful landscape in which mountains, hills and valleys alternate in the most pleasing manner. The valleys are highly fertile and contain valuable farms. The mountains are clothed with forests and the streams are clear and rapid. In the northwestern part of the state are a number of caves, some of which are more than locally interesting. Hardin Cave near Kingston has large chambers, some of them 30 ft. high. Chickamauga National Park is surrounded by hills and mountains and is of interest because of its beauty as well as its historical associations. Tallulah Falls in the northeast are of unusual beauty and picturesqueness, giving to this region the title, "Switzerland of the South."

Climate. In the northern part of the state the summers are cool and delightful and the winters mild, making this region an attractive resort both in summer and in winter. In midwinter there is considerable snow on the mountains, but in the valleys it soon disappears. The central part of the state has a somewhat warmer climate than the northwest. In the lowlands of southern Georgia the summers are exceedingly hot and in winter snow is practically unknown. The rainfall varies, being heaviest in the north. Its average for the entire state is about 49 inches.

Minerals and Mining. A remarkable bed of clay several miles wide extends across the state from Augusta to Columbus. This clay is free from im-

purities and is suitable for making brick and tile. Below the Fall Line are found extensive beds of clay suitable for glazed brick, pottery and terra cotta. Marble of excellent quality occurs in large quantities in Gilmer, Pickens and Cherokee counties. The famous "verde antique" can be duplicated from these quarries. The largest quarries are in Pickens County. Georgia is the second marble-producing state in the Union and contains more asbestos than any other state, while granite, gneiss, limestone, and bauxite (aluminum ore) are found in large quantities. Manganese, corundum, coal and iron are also important. Gold is found in a number of localities, but is not relatively important. Slate, soapstone, graphite, lead and copper also occur. When the demand for these minerals warrants they will all be exploited.

Forests and Lumber. Georgia has over 17,000 sq. m. of pine forests, besides large forests of cypress, live oak, poplar, ash, beech, chestnut, maple and other woods. Pine, cypress and palmetto occur in the lowlands of the Coastal Plain, but most of the other forests are in the mountainous sections. Lumbering is one of the leading industries and there is about $12,000,000 invested in it. Georgia is the foremost lumber-producing state in the South. It is also the leading state in the production of tar, turpentine and rosin.

Agriculture. Agriculture is the chief industry and in central Georgia fully three-fourths of the land is under cultivation. There are many small farms, especially in the northern part, but in the middle and southern parts many of the large plantations are held together. In the cotton regions, the farms are mostly worked by negro tenants. A great variety of crops is produced.

Soil. The northern part of the state has a dark red soil which is very fertile. The soil in the lowlands is deep and also fertile. Much of that in the central part of the state is a yellow loam.

Products. Cotton and corn are the chief crops of the central and of the southern part of the state. Cotton is the leading crop and averages about 2,000,000 bales, making Georgia the second cotton-producing state. On the islands along the coast the long-fiber, or sea-island, cotton is raised. Rice is grown on the lowlands, and in the southern part of the state sugar cane of excellent quality is produced. Farther inland apples, peaches, pears, cherries and other kinds of small fruits are raised. Large quantities of wheat, rye, oats, buckwheat, clover and timothy are also produced in the central and northern sections. In some sections market gardening is profitable. Excellent pasturage is found in the mountainous regions and here live stock is an important source of income.

Manufactures. Georgia is the leading manufacturing state of the South, both in variety and extent of her manufactures. Since 1890 manufacturing industries have increased very rapidly. The production of cotton goods leads all other industries. The rapid development and success of this industry have been almost phenomenal. The manufacture of hosiery and other knit goods is also important, and woolen goods are produced to considerable extent. The manufacture of lumber and lumber products, tar, turpentine and rosin, furniture, cars, carriages, brick, tile and pottery, chemicals and paint, butter and cheese and the canning of fruits and vegetables are other important industries, from each of which a good revenue is derived.

Transportation and Commerce. Georgia has over 6000 m. of railway. The leading systems are the Atlantic Coast Line, the Seaboard Air Line, the Southern, the Central of Georgia and the Georgia railroads. There are also a number of other lines so that all sections of the state have good railway facilities. Numerous electric lines are found connecting cities and their suburban towns. The chief railway centers are Atlanta, Savannah, Augusta, Macon and Columbus.

Georgia has an extensive trade with other states and some trade direct with foreign countries. The exports consist of fruits and other agricultural produce,

lumber and lumber products, tar, turpentine and rosin, cotton and woolen goods and other manufactures. The imports include raw material for manufactures, manufactured goods and such foodstuffs as are not raised with profit within the state.

GOVERNMENT. The present constitution was adopted in 1877; the rights of the people are carefully safeguarded and the Legislature is prevented from making extravagant appropriations. The executive department consists of the governor, attorney-general, comptroller-general, treasurer, state superintendent of schools, commissioner of agriculture, state geologist and state librarian. The chief boards are those of railway commissioners, prison commissioners and education. All these officers are elected for two years.

The Legislature consists of the Senate and the House of Representatives. The senators are apportioned among districts and the representatives among counties according to population. Members of each house are chosen for two years. The sessions are annual and limited to 50 days.

The judicial department comprises a Supreme Court consisting of one chief justice and five associate justices elected by the people for six years, a Court of Appeals of three justices elected for six years, and a Superior Court in each judicial district. The judges of the Superior Court are elected by the people for four years.

EDUCATION. The state maintains a complete system of public schools which is constantly increasing in efficiency. The schools are in charge of the state superintendent of schools and state board of education. The school fund is derived from both state and local taxation. In the cities and towns graded schools with high schools are maintained for white and for colored children. The University of Georgia at Athens is at the head of the educational system and maintains an official relation with the following state institutions: North Georgia Agricultural College at Dahlonega; Georgia School of Technology at Atlanta; Georgia Medical College at Augusta; Georgia Normal and Industrial College for Colored Youth at Savannah; Georgia Normal School (for both sexes) at Athens; Georgia Normal and Industrial College (for girls) at Milledgeville; South Georgia Normal School at Valdosta. There are 11 agricultural high schools.

The higher institutions not under control of the state are Emory College at Oxford; Mercer University at Macon; Oglethorpe University at Atlanta; and the following colleges for women: Agnes Scott College at Decatur; Lucy Cobb Institute at Athens; Wesleyan Female College at Macon; Cox College at College Park; Brenau College at Gainesville; Bessie Tift College at Forsyth; Southern Female College at La Grange; Andrew Female College at Cuthbert; and Shorter College at Rome.

STATE INSTITUTIONS. The state sanatorium for the insane is at Milledgeville, the Georgia Institute for the Deaf and Dumb is at Cave Spring and the Academy for the Blind at Macon. There are also a number of orphan homes, reformatories and industrial institutions under private control.

CITIES. The chief cities are Atlanta, the capital; Savannah, Augusta, Macon, Columbus, Athens and Brunswick.

HISTORY. Georgia was named for King George II. The territory, wandered over by De Soto and by Ribaut, belonged originally to Carolina, as granted by Charles II. When Carolina became a royal province, this strip was reserved as crown property.

James Oglethorpe, aiming to establish a colony for honest debtors and bankrupts, came from England with 35 families, and founded Savannah in 1733. The colony slowly prospered under a most liberal government, and in the war of 1739 the refugees were able heroically, though vainly, to oppose the Spanish. When, however, Oglethorpe returned to England in 1743, the colony declined under trustee rule, partly because of attempts to stop trade in slaves and in rum. Georgia's charter was surrendered

in 1752 and it became a royal province, continuing under this form of government till the Revolution. In 1763 the boundaries were extended to include Mississippi. The British in 1778 conquered Georgia, over which they reinstated a royal governor. In July, the same year, the state had signed the Articles of Confederation. It accepted the Constitution in January, 1780. About 1825 a heated controversy took place between the United States and Georgia regarding the Creek Indians in the state. It was finally settled by removing the Creeks to Indian Territory.

Despite the strenuous opposition of Alexander H. Stephens and others, Georgia withdrew from the Union, Jan. 18, 1861. The state suffered severely during the Civil War and reconstruction was slow. It reentered the Union in July, 1870. Recent development of Georgia's resources is making her one of the most prosperous states in the Union.

GOVERNORS. John A. Treutlen, 1777-1778; John Houston, 1778-1779; John Wereat, 1779; George Walton, 1779-1780; Richard Hawley, 1780; Stephen Heard, 1780-1781; Myrick Davies, 1781; Nathan Brownson, 1781-1782; John Martin, 1782-1783; Lyman Hall, 1783-1785; Samuel Elbert, 1785-1786; Edward Telfair, 1786-1787; George Matthews, 1787-1788; George Handley, 1788-1789; George Walton, 1789-1790; Edward Telfair, 1790-1793; George Matthews, 1793-1796; Jared Irwin, 1796-1798; James Jackson, 1798-1801; David Emanuel, 1801; Josiah Tattnall, 1801-1802; John Milledge, 1802-1806; Jared Irwin, 1806-1809; David B. Mitchell, 1809-1813; Peter Early, 1813-1815; David B. Mitchell, 1815-1817; William Rabun, 1817-1819; Matthew Talbot, 1819; John Clarke, 1819-1823; George M. Troup, 1823-1827; John Forsyth, 1827-1829; George R. Gilmer, 1829-1831; Wilson Lumpkin, 1831-1835; William Schley, 1835-1837; George Gilmer, 1837-1839; Charles J. McDonald, 1839-1843; George W. Crawford, 1843-1847; George W. B. Towns, 1847-1851; Howell Cobb, 1851-1853; Herschell V. Johnson, 1853-1856; Joseph E. Brown, 1857-1865; James Johnson, 1865; Charles J. Jenkins, 1865-1868; Thomas H. Ruger, 1868; Rufus B. Bullock, 1868-1871; Benjamin Conley, 1871-1872; James M. Smith, 1872-1876; Alfred H. Colquitt, 1876-1882; Alexander H. Stephens, 1882-1883; James S. Boynton, 1883; Henry D. McDaniel, 1883-1886; John B. Gordon, 1886-1890; W. J. Northen, 1890-1894; W. Y. Atkinson, 1894-1898; A. D. Candler, 1898-1902; Joseph M. Terrell, 1902-1907; Hoke Smith, 1907-1909; Joseph M. Brown, 1909-1911; Hoke Smith, 1911; Joseph M. Brown, 1911-1913; J. M. Slaton, 1913-1915; Nat E. Harris, 1915-1917; H. M. Dorsey, 1917-1921; T. W. Hardwick, 1921—.

Georgia, Strait of, the main section of that part of the North Pacific Ocean which separates Vancouver Island from the Continent of North America, communicating indirectly with the ocean through Queen Charlotte Sound in the north and the Strait of Juan de Fuca in the south. It is about 250 m. long, averages about 25 m. in width and has soundings to the depth of over 1000 ft. It receives the Fraser River and smaller streams.

Georgia, University of, an institution of collegiate grade located at Athens. It was chartered in 1785 and from this viewpoint is the oldest state university in the country. It did not, however, open its doors until 1800. It includes the Franklin College of Liberal Arts, Georgia State College of Agriculture and Mechanic Arts, the law school and the graduate school, all located at Athens. There are also a number of colleges located in different parts of the state which are affiliated with the university. The university is at the head of the educational system of the state, and by the terms of the charter the primary and secondary schools are officially connected with it. The university proper is not open to women. The enrollment is about 500.

Georgian Bay, an extensive arm of Lake Huron indenting the Province of

Ontario. A long narrow peninsula partially separates it from Lake Huron at the south, and Great Manitoulin Island forms the northwestern boundary. The bay is 120 m. long and 50 m. broad; it has many beautiful islands and its shores are picturesque. Owen Sound and Collingwood are the chief ports. Georgian Bay was formerly known as Lake Manitoulin.

Geranium, *Je ra' ni um,* a name given to a number of genera of the Geranium Family. The wild geranium, or cranesbill, is a rough, roadside plant of dry woods or woody roadsides, and flowers in the spring and summer. The stem is straight and brittle, with leaves much-divided and sometimes marked with whit-

CRANESBILL GERANIUM

ish spots. The flowers are of a pale magenta or pale blue color and are borne in pairs at the ends of long, branching stems. There are five petals, which are arranged to form a shallow cup. After the flower falls, the dry seed pod lengthens into a slender, pointed spike which gives the plant its common name, cranesbill.

The name geranium has also been generally applied to a common house plant which is really the pelargonium, a plant of a closely-allied genus. These plants are all perennials and natives of the Cape of Good Hope. They are popular for cultivation because they thrive with little care and have luxuriant, fragrant foliage and brilliant, varied flowers. The best-known cultivated pelargoniums are the so-called rose geranium, the ivy-leafed geranium and the Lady Washington geranium.

German East Africa, a mandatory of Great Britain in Africa, formerly a protectorate of Germany, lying between Congo State and the Indian Ocean and bounded on the n. and s. by British possessions. Along the coast the country is flat, but beyond lie lofty mountain chains, traversing the country in irregular ridges and reaching their highest point in the extinct volcano, Kilimanjaro, at the north. Beyond the mountains is an agricultural region drained by numerous rivers and dotted with lakes. The great lakes, Victoria Nyanza, Kivu, Tanganyika and Nyassa, lie upon its boundaries or partly within them. Agriculture is the chief industry, and fruits, cocoanuts, areca nuts, millet, grains, castor oil, sugar cane, vegetables, tobacco, cotton, vanilla, India rubber, coffee and cocoa are produced. Ivory, gums and sesamun are exported, and in the mountains coal, iron and a little gold are mined. The German Government maintains schools and churches. Population, about 10,032,000.

German Language. See LANGUAGE, subhead *Teutonic Languages.*

German Silver, a white alloy of copper, nickel and zinc. The proportions are generally one part zinc, one part nickel and two parts copper, and when the articles are to be cast or molded, two per cent of lead is added to make the mixture more fusible and ductile. German silver is harder and tougher than silver or brass, and takes a high polish. It is easily corroded by acids, and especially by vinegar. It it sometimes plated with silver, and with alloys of nickel containing tin and cadmium and known under the names of silveroid, argentoid, nickeline and navoline.

German Southwest Africa, a mandatory of the Union of South Africa, formerly a German colony, lying between the Portuguese territory and the South

African Union and washed by the Atlantic Ocean. Walfish Bay, a British possession, lies at the center of its coast. The coast is low and many of the harbors are sand-blocked. Farther inland are high plateaus advantageous for grazing land, and agriculture is the chief occupation. Cattle, sheep, horses, mules, goats, swine and camels are raised. Copper and diamonds are mined and exported. Angra Pequeña, the first German possession in Africa, is on the southern coast; Windhoek is the capital. The population is about 83,900.

Germantown, Battle of, an important battle of the Revolutionary War, fought Oct. 4, 1777, in a village several miles northwest of Philadelphia. Here the main British force under Howe was stationed and detachments were sent to seize Ft. Mercer and Ft. Mifflin. Aiming to take advantage of this division in troops, Washington advanced upon Germantown, at daybreak, in two converging columns. During the engagement a heavy fog arose and, in the confusion which followed, Americans under Stephen fired upon Americans under Wayne. The panic that ensued compelled the Americans to retire, but the British loss in killed and wounded was almost equal to that of their opponents. The ingenuity of Washington's attack on Germantown made a great impression on military cities in Europe and was one of the causes of the French alliance.

Germany, a country of central Europe, bounded on the north by the North Sea, Denmark and the Baltic Sea; on the east by Poland, Czecho-Slovakia, and Austria; on the south by Czecho-Slovakia, Austria, and Switzerland; on the west by France, Luxemburg, Belgium, and the Netherlands. The province of East Prussia occupies a peculiar position in regard to the rest of the Republic since it is almost surrounded by Poland and is separated from the main body of Germany by the free area of Danzig and the northward projecting arm of West Poland. In area, present Germany comprises very nearly 171,000 square miles; and contains an estimated population of 58,000,000. The line of greatest length extends from southwest to northeast, about 675 miles.

The Country. The topography of Germany falls naturally into three main divisions: the highlands of the southern part, the secondary mountains or highland area of the center, and the lowlands in the northern part.

Highlands. The Alps do not extend far into Germany. Along the borders of Bavaria the elevation of the highest peaks reach into the region of perpetual snow. The Alpine foreland averages 1600 ft. in height, and forms the German part of the Danube basin. The central highland region extends from the Carpathians to the Rhine and contains numerous ranges, such as the Riesengebirge, Vosges, Harz and Erzgebirge. Schneekoppe in the Riesengebirge reaches 5266 ft., and is the highest elevation. The valleys are shallow, having been filled by the sediment which ice and constant denudation have removed from the mountains. The general character of the southern part of Germany is broken with ranges of forest clad hills and intervening fertile valleys.

Lowlands. The northern plain of Germany is uniformly low, and merges gradually into the lowlands of Netherlands and the plain of Russia on each side. The slope of the country is to the north and northwest, and along the shores of the North Sea there is a low coastal plain. There are numerous sand dunes, but where they do not serve as sufficient protection against the approaching waters it has been found necessary to construct dikes, or sea walls, frequently referred to as the "golden hoop." The good harbors are few and the important ports include Hamburg, Bremen, Lübeck, Kiel and Stettin.

Rivers and Lakes. There are two river systems of Germany, the northern and the southern, for which the Central Highlands form the watershed. The Rhine is the only stream which crosses these highlands and binds together the two divisions. Its main course is through Germany, but it belongs also to Switzer-

land, where it finds its source, and to Holland, a country formed by its delta. The Danube drains the waters of the southwestern part of Germany into the Black Sea. The Weser, the Elbe and the Ems flow into the North Sea; the Oder Vistula, Pregel and Memel fall into the Baltic.

The lakes of the Alpine forelands reveal distant traces of glacial origin and appear only in those parts which were covered by the immense ice sheet that descended from the Alps at the time of the Great Ice Age. In the northern lowlands are shallow shore lakes; the Central Highlands have none of significance.

Climate. The chief climatic differences of Germany are rather between the east and the west than between the north and the south, for the higher altitude of the south counteracts the differences that would naturally arise as a result of the variation in latitude. The climate of western Germany resembles, in general, that of France, and is fairly mild in winter and temperate in summer. In the east it becomes continental, and is severe except near the coast, where it is tempered by the Baltic Sea. The heaviest rainfall is in the mountainous regions. The maximum precipitation is about 28 inches.

The People. The population of Germany possess ethnic unity,—they are all Germans. In the days of the empire, there was a Polish element in eastern Germany that persistently clung to its language. But that territory is now a part of New Poland. Ninety per cent of the Germans of Europe are citizens of Germany, Austria being the only other German nation. In Germany itself there are only slight dialectical differences between the inhabitants of North and South Germany, in other words,—low and high German, and there are only slight physical differences—as between Bavarians and the Saxons,—survival of tribal variations in early times.

Among the slightly different ethnic strands that unitedly compose the German people the most noticeable are the Saxons, the Bavarians, and the Prussians. The common race or subrace from which all the people of Germany diverged was the Teuton,—the people that in very early times inhabited that part of Europe lying to the north of the Alps, west of the Oder to the Rhine, vaguely known by the Romans as Germania. The Saxons are almost pure Teutons. They occupy one of the most fertile regions of Germany. The Bavarians are racially the most composite people of Germany, being descended from Slavs, earlier Celtic people, and Teutonic tribes that entered the country from the east and were known as Baivari. The Prussians are the most important element of the German population. Their original home was East Prussia and they were near kindred to the Lithuanians and the Letts. They derive their name from the Borussi, one of the three cognate tribes living in that section at the opening of our era. In the tenth century they were on the lowlands of the Oder, Vistula, and the Nieman. In the process of time they became the most powerful group among the Germans.

Mineral and Forest Wealth. Having lost the rich iron fields of Alsace-Lorraine and control of the coal fields of the Saar Basin, in the western part of the Palatinate, the mineral production of the Republic will not be as noticeable as were those of the Empire. But there are still rich deposits of coal in Westphalia, some in Upper Silesia, Saxony, and Bavaria. Lignite is produced in many sections and, made into bricketts, is a valuable products. The known iron fields are not large. Three-fourths of all the iron formerly produced came from Alsace, now a part of France. The silver mines, however, are among the richest in Europe, and are found chiefly in the highland sections of Prussia and Saxony. Other mineral deposits include rock salt, potash salt, petroleum—in limited quantities — manganese, sulphur, alphalt, nickel, copper, bismuth, zinc and lead.

One-fourth of Germany is covered with forests, as carefully attended to as any field crop, since forestry is a science. In the west the forests are composed of

leaf trees, of which the beech is the principal representative. Further east and in the more rugged sections the conifers,—pines and fir trees—abound. The Black Forest—an extensive region across the Rhine opposite Alsace, is so named because it contains a wealth of evergreen trees.

Agriculture. Up to the time of the middle of the 19th century, Germany was pre-eminently an agricultural country. About one-third of the population is now engaged in the pursuit of agriculture which is pursued scientifically. Improved methods of cultivation and increased use of machinery have advanced productivity. The river valleys of the south and west are most fertile. Large crops of cereals and potatoes are raised annually. The production of corn is limited exclusively to the south. Wheat, oats, rye and barley grow in all parts of the country. Other products are flax, hemp, hops, and tobacco. The vine, grown principally in the valleys of the Main and the Saale, the Rhine and the Moselle, yield many million gallons annually. The land is divided among large landowners, who control immense estates, but many peasants have farms averaging only about five acres in size, used as garden plots. About 86 per cent of the land is worked by owners. Stock breeding is an important industry, and ample opportunity for grazing is afforded by the rich meadows on the marshes bordering the North Sea. The horses bred in Mecklenburg, Hanover and other provinces enjoy a wide reputation. One of the most important agricultural products is sugar beets. In fact, Germany was the home of sugar beet culture. The greatest attention is given to the scientific development of the beet. The selection of mother beets for seed purposes is made with great care.

Manufactures. In the closing years of the Empire Germany was making wonderful advance as a manufacturing nation. But the Republic has lost the rich manufacturing field of the tip of Upper Silesia, her colonies are a thing of the past, her navy is destroyed and much of her merchant marine has been given up. One great field of industry—the making of cannons and implements of war, formerly of great importance—is forbidden. But the very inertia of past activity enables Germany to take a prominent role among manufacturing nations. The clothing industry is very important and occupies the larger proportion of the laboring population. A close second is the textile industry, the oldest and most important industrial art of the country. Manufacturers of cotton, silk, linen, and flax are prominent industries. Other industries are brewing, printing, type founding, the manufacturing of musical instruments, silver, gold and jewelry work, rubber and gutta-percha goods, clocks and glass and pottery ware. Before the war, the chemical industry was almost a German monopoly and the manufacture of drugs, rare chemicals and dyes was very important. Forced by the necessities of war, other nations, especially the United States, learned the secret and will dispute that field in the future. Germany formerly supplied a large part of the world's potash, but other sources of supply have been found in the United States.

Commerce. Germany made wonderful advance in international trade during the fifty years of peace the Empire enjoyed, in fact, her foreign trade increased four-fold. Foreign commerce is a matter of scientific investigation. The needs of foreign nations are studied; banking facilities are arranged, methods of shipment are considered and her salesmen are educated for their work. Foremost among her imports are cotton, wheat, lumber, copper, petroleum, lard, maize, machinery, meat and dried fruits. The exports consist principally of textiles, chimicals, iron and steel products, scientific instruments, jewelry, malt liquors, small wares and gold and silver wares.

Transportation. The railroad system of Germany is the most extensive in Europe,—about 30,000 miles. Built with an eye for military needs, every important point in the republic can be reached from the capital in 24 hours. The entire system

is under the control of the general government at least for all of the interstate lines. All can be taken under such control in times of need. Some lines are directly controlled by the states in which they are situated. The inland water transportation routes were worked out scientifically for purposes of both peace and war, and now advance the interests of the Republic. The principal rivers are navigable for considerable distances. Then canals connect many of them. Thus the Ludwig canal unites the Danube with the Main in Bavaria; the Plauen Canal connects the Elbe with the Havel; the Eider Canal joins the Eider River and the Kiel. Canals enable waterborne commerce to pass from Berlin to Baltic sea ports; from Hamburg to the Rhine cities.

GOVERNMENT. Germany was provisionally organized as a republic in November, 1918. The constitution was adopted July 31, 1919. Provisions were made for organizing the various grand duchies, duchies, and principalities of the former Empire into more suitably arranged divisions. At present the four principal states are Wurtemberg, Bavaria, Saxony, and Prussia. Each German state must have a republican form of government. All officials are elected on the basis of universal, direct and secret balloting. It will be noted that women's suffrage prevails in Germany.

The Congress of the Republic consists of two chambers. The lower house is the Reichstag. The members are elected from the German states on the basis of population. The upper house is the National Council or Reichsrat. The members represent the German states. Every state has at least one member, and other members on a basis of population. No state can have more than two-fifths the total number of members. A national law takes precedence over state laws, but in all matters affecting the respective states, the states themselves exercise the powers of government. Provisions are made for a referendum of important legislative acts if it be desired. The president is elected by universal suffrage for a term of seven years. He may be deposed from office before the expiration of his term, if the Reichstag by a two-thirds vote so order.

In the matter of personal rights the German citizen enjoys the liberties of the most advanced states. Liberty of press, of speech, of religion are all granted. All Germans are equal before the law. Men and women have fundamentally the same civil rights and duties. All distinctions of rank are abolished.

JUDICIARY. There is a Supreme Court that has jurisdiction in national matters and in cases between German states. Then there are various state courts that administer justice in the several states. Judges are elected for life. Military law is abolished except in times of war and on battle ship.

EDUCATION. Liberal provisions are made for education. The schools fall into two main divisions. The basic schools, or schools for all, in which attendance is compulsory unless the pupils attend popular schools, which are, broadly speaking, parochial schools. The public schools are followed by intermediate and high schools. The popular schools are followed by technical and continuation schools. In both instances attendance continues to the eighteenth year. Tuition and books are free. In case the parents need assistance in order to give children the benefit of an education such aid is given by the state.

HISTORY. The present territory of Germany has been the home of the German people from extremely early times. In that territory they slowly evolved from the tribal state of society into that of modern political society. The present area of Germany, however, has in historic times always been the section whence migrating tribes issued, pushing out in all directions, coming in contact with other branches of Aryan people in Europe,—the Celts to the west, the Greco-Romans to the south, the Slavs to the east; and to the southeast Finno-Ugrian people, — the Huns, Magyars and Turks. But their kindred left behind in the home land remained

in substantially the same sections, and were on the whole but little influenced by the people just named. So in some respects the history of the German people, their political evolution and their national ideals are peculiar to the people of Germany.

The Roman Empire with which the migrating Teutonic tribes came in contact was such an impressive reality that after it had fallen in ruins, the more successful kings of the day constantly planned to rebuild it with more than its former glory. Charlemagne (742-814) succeeded in this great undertaking. He was one of the greatest statesmen, warriors and rulers that ever lived. When he died his empire extended from the Baltic to the Mediterranean, from the Atlantic to the Banks of the Danube. For his great service in behalf of the Church of Rome, he was crowned (800 A. D.) by the Pope and proclaimed "Emperor and Augustus," the titles of the Roman Emperors when Rome comprised the known world. Thus a new Rome was created and for 1000 years that shadowy empire survived and for the most of that time the Emperor of Rome was also the emperor of a more or less united Germany. Through all these centuries of German history, we must bear in mind that the king was elected; that the country was broken up into many independent principalities, duchies, etc., a survival from tribal society, whose ruling men, and finally whose princes formed the council of the kingdom and the electors of the king.

During the five hundred years following the crowning of Charlemagne there were four different dynasties or ruling houses that furnished the rulers of Rome. They were simply the most powerful German rulers and exercised more or less centralized power over the many German states into which the independent tribes of earlier times had crystalized. If we note more particularly these dynasties it will help us to an understanding of the times. The Karling line (Charlemagne) was succeeded, early in the tenth century, by the Saxon line of emperors, who were also the kings of Saxony, that country being at that time the most powerful German state. Otto I of this line is considered "the greatest sovereign of the tenth century." A map of Europe of the tenth century shows a Germany almost identical with that of today, though Bohemia and Austria were included in the empire of that time.

A century later (1024) we find Franconia the ruling power. The center of power had shifted to the west and south of Saxony. In 1137 the Hohenstauffen line succeeded, they were dukes of Swabia, still further to the southwest. Frederick Barbarossa and Frederick II were members of this dynasty. It was customary in those days for bishops, prelates, and abbotts to have temporal possessions over which they claimed control, and here was another element of division in addition to the inheritance from tribal times. It was only the strongest and most energetic of the emperors that exercised any effective control over the multitudinous German states of his empire. When the Hohenstauffen dynasty came to an end (1254) there was no German duke or king who cared for the onerous duties of empire and for twenty years there was no central authority. It was a time of utmost confusion. Then arose a generation of robber knights who built strong castles in easily defended positions and robbed and plundered almost at will. During this time also various cities and trade guilds organized for self-protection. The most important was the Hanseatic League.

At length they selected Rudolph of Hapsburg (1273), which marks the rise to power of the House of Hapsburg which played for 650 years such an important role in European hsitory, especially in German history, still more prominent in the affairs of Austria. Rudolph's rule was vigorous. He began by forcing Bohemia to acknowledge his sway, and he destroyed seventy castles of as many robber knights throughout Germany generally. He conquered Bohemia, reduced Germany to order, founded Austria, and organized Switzerland.

From 1308 to 1437 the Hapsburg line was interrupted by a succession of emperors elected from various princes of Germany, Hungary and Bohemia. The most renowned one among them was Charles IV of Bohemia (1347-1348) author of the "Golden Bull" that made Frankfurt the place of election of the emperor, Aix the place of coronation, and named seven officials in Germany to serve henceforth as electors of the emperor. These seven were the princes of Bohemia, Brandenburg, Saxony and the Palatinate of the Rhine; and the archbishop of Mainz, Cologne and Treves. Notice at that date neither Austria nor Bavaria were of great importance. The selection of Brandenburg shows the rising importance of the mark of Brandenburg. Notice also, as indicative of the times, that three of the seven electors were dignitaries of the church of Rome.

Charlemagne and the early emperors rendered great service to the Church, perhaps saved it from destruction. With the passage of time, the church grew in power and differences began to appear between the church and some of the emperors. Noticeably so in the case of Henry IV (1056-1106) who "went to Conossa," Barbarossa (1156-1190) and Frederick II (1212-1250) whose brilliant reign closed in gloom, ushering in that period of confusion when no one cared to assume charge of the empire. Then came the times of the Reformation and the Hussite wars, later still the terrible times of the Thirty Years War in which Germany suffered greatly. In all the years of their history there was no such a time of gloom and despair for Germany as that which included the Thirty Years War (1618-1648).

The House of Hohenzollern was the ruling house of Prussia. There is a strange parallelism between the Hohenzollern and the Hapsburg royal houses. Both took active parts in the history of Germany, both founded great empires, both met a common fate. In 1411 Frederick of Hohenzollern became Margrave of Brandenburg and so one of the seven electors of Germany. A century later the Mark of Brandenburg was united with the duchy of Prussia though the duchy was a part of Poland. By the treaty of Westphalia, Pomerania was added to the territory of Prussia. In 1701 the Duke of Prussia was allowed to assume the title of king. In 1740 Frederick the Great became king. He it was who initiated the Prussian policy of helping himself by force to surrounding territory. He wrested Upper Silesia from Austria, and took a prominent part in the successive partitions of Poland. At his death Prussia was the strongest state in north Germany and was aspiring to leadership of all the German states.

One hundred years later in the days of Bismarck that leadership became a reality. As a result of the three Bismarckian Wars,—Schleswig-Holstein (1864), the Seven Weeks War (1866) with Austria, resulting in the elimination of Austria from participation in the political affairs of the German states, and the Franco-German War (1870) wherein all German states except Austria united under the lead of Prussia against France. At the conclusion of that war, there was organized the first real German Empire with Prussia as the leading state and the right of succession to the imperial throne made hereditary in the House of Hohenzollern.

Into that empire were gathered four kingdoms, six grand duchies, five duchies, seven principalities, three free cities, and the Reichland of Alsace-Lorraine, these twenty-six territorial units being the form finally assumed by the multitudinous German states of earlier centuries; or, to trace them still further back, the modern representatives of the German tribes of prehistoric times. That empire represented the final stage of 1,000 years of evolution. It was not the shadowy revival of the Roman Empire, the fiction of which was given up in 1740, but it was a present day empire of abounding life and vigor. It took its place among the great nations of the world. It seemed as if founded on the rock and destined to stand for ages. Yet, its span of life was less than half a cen-

tury. Three emperors occupied the throne,—William I (1871-1888), Frederick III (three months of 1888), and William II who abdicated the throne November 9, 1918, when the German Empire ceased to exist. The unity of the German people, however, was not lost, and they begin a new cycle of history. (See under their headings the WORLD WAR and many historical persons and places mentioned in this article.)

Germicide, *Jer' mi side.* See INSECTICIDE.

Ger"mina'tion, the early stages in the development of the germ or young plant. It depends upon the return of the dormant germ to active life, and is hastened or retarded by the conditions of heat, light and moisture. In seed-bearing plants, the seed absorbs water, which causes the embryo to swell and burst

GERMINATION OF SEEDS

through its seed coats. The root then emerges and anchors the plant to the soil, at the same time supplying it with food and moisture. As soon as food is supplied the growing plant, the stem erects itself and the seed leaves, or cotyledons, spread out. These soon become able to perform their function, that of transforming the gases from the air into food. The plant is then said to have germinated. Plants which feed upon living or decaying vegetable matter have special adaptations to their needs and do not produce leaves. Spore-bearing plants separate from the mother plant without any fertilization of the spores, and in the lower forms of life continue in practically the same forms throughout the entire development.

The accompanying cut shows the seed in the varying stages of its germination: 1 is the winged seed of the maple ready for sowing; 2 shows the developing seed leaves as they begin to unfold; in 3 the leaves have unfolded and the stem has formed; and in 4 the seed leaves are shown in their position on the rapidly-growing shoot; 5 shows the above- and below-ground growth of the oak from the acorn. See SEED; SPORE.

Germ Theory of Disease. See BACTERIA.

Gérôme, *Zha" rome',* **Jean Léon** (1824-1904), one of the most eminent French painters of the 19th century. After considerable study with Delaroche, he created a stir with his *Greek Cock-fight,* exhibited in 1847, and now in the Luxembourg. He produced a number of very successful Eastern subjects following a trip to Egypt and Turkey. But Gérôme's most splendid qualities are seen in those works which reveal his minute knowledge of historical detail, intensity and dramatic power. Such a work is the *Age of Augustus,* a remarkable allegory in which is depicted the grandeur of the Augustan Age, with a subtle suggestion of its decline before the advance of Christianity. Other scholarly and vivid creations are *The Gladiators before Cæsar, Phryne before her Judges* and *the Death of Cæsar.*

Geronimo, *Je ron' i mo,* (?-1909), a chief of the Chiricahua tribe of Apache Indians. In 1884-1886 he became noted as the leader of a band that terrorized Arizona and New Mexico. General Crook was sent against him, and in March, 1886, Geronimo and his band surrendered, only to escape to the mountains a few days later. Crook was thereupon superseded by Gen. Nelson A. Miles, who gave the Indians no rest until Geronimo again surrendered. This time he, with

his principal followers, was sent to Ft. Pickens, Fla., where he was held as a military prisoner for some time.

Ger'ry, Elbridge (1744-1814), an American statesman, born at Marblehead, Mass. He graduated from Harvard in 1762, received his master's degree three years later, and, engaging in business, soon amassed a considerable fortune. In 1776 he was a member of the Continental Congress, and signed the Declaration of Independence. He served in Congress until 1780, and was reelected in 1783 and 1785. He was a member of the Federal Constitutional Convention but refused to sign that document because of his opposition to centralized government. In 1789-1793 he served in Congress; in 1797 he was a commissioner to France; and in 1810-12 he was governor of Massachusetts. In the latter position he removed from office members of the opposition party, and assisted in so redistricting the states as to keep his own party in power; hence the term *gerrymandering*. In 1812 he was elected vice-president of the United States, but did not live to complete his term of office. See GERRYMANDER.

Ger"ryman'der, a word used in the United States to denote an unfair distribution of election districts within a state. This is accomplished by combining counties having a large majority in favor of the manipulating party, with others in which that party has a minority a little smaller than its majority in the former. The result of a full vote is a small majority for the manipulators. The gerrymander has been practiced perhaps in every state in the Union. It is a strictly legal measure and is a great temptation to politicians who desire to perpetuate their control by whatever means are possible and safe.

The word was first coined in 1812 when Elbridge Gerry was governor of Massachusetts. At that time the Republican Legislature redistributed the districts in such wise that the shapes of the towns forming a single district in Essex County gave it a somewhat dragonlike contour. This was indicated upon a map of Massachusetts which a Boston newspaper published in colors, giving it a few additional touches in the shape of head, wings and claws and naming it the "Gerrymander." The name was a fusion of *Gerry* and the last part of the word *salamander,* the name of a lizardlike animal which the picture strongly resembled.

Gethsemane, *Geth sem' a ne,* an olive orchard near Jerusalem and on the road to the Mount of Olives. The name means oil press. It was to this garden that Christ took his disciples on the night of his betrayal and left them while he went forward alone to pray (Consult *Matt. xxvi, 36*). The site of the orchard is disputed, and in one place the Franciscan monks have enclosed an area where they cultivate flowers to present to the tourists who visit the Holy Land; in another locality the Greek Church has marked off a spot which it claims as the site of the garden. The ancient olive trees in this garden, though very old, probably do not date back to the time of Christ.

Get'tysburg, Pa., county seat of Adams Co., 35 m. s.w. of Harrisburg, on the Western Maryland and the Gettysburg & Harrisburg railroads. It is the seat of a Lutheran theological seminary founded in 1826, and of Pennsylvania College (Lutheran), organized in 1832. The surrounding country is uneven and is diversified by several hills called Seminary Ridge, Cemetery Hill, etc. Gettysburg was settled in 1780 and named after Gen. James Gettys, its founder. One of the most noted battles of the Civil War was fought here, July 1-3, 1863, the Federal army under General Meade defeating the Confederates under General Lee. The entire battlefield has been included in a national park and numerous monuments have been erected upon the field. It is thought that the scene of the combat is better marked than any other battlefield of the world. On Cemetery Hill stands the National cemetery, 17 acres in area, dedicated by President Lincoln on Nov. 19, 1863. About one mile from Gettysburg is the Katalysine Spring, a noted summer resort. The industrial es-

tablishments of Gettysburg comprise shirt and furniture factories, planing mills and a foundry. Population in 1920, 4,439. See GETTYSBURG, BATTLE OF.

Gettysburg, Battle of, the greatest battle of the Civil War, fought July 1 to 3, 1863, at Gettysburg, Pa., between 88,000 Federals under Meade, and 75,000 Confederates under Lee. After Hooker's defeat at Chancellorsville, Lee again took the offensive and, having crossed the Potomac and Maryland, entered Pennsylvania. While in hot pursuit Hooker was succeeded by Meade, as commander of the Army of the Potomac. The two armies finally met on the hills about Gettysburg, the Federals taking up a strong position on the bluffs south of the town, while the Confederates were a mile away on a parallel ridge. Buford and Hill opened the battle, being soon joined by Reynolds and Longstreet respectively, and by nine o'clock of the morning of July 1 the battle raged on Seminary Ridge, which is west of the village. Both sides were again reinforced and by mid-afternoon the Union troops were being pressed back to Gettysburg, where the right wing under Gen. Carl Schurz at length retreated with frightful loss. When the left wing took refuge on Cemetery Ridge, south of the town, fighting ceased for the day. Thus far only the advance of both armies had seen action, which had been accidental, and Meade did not arrive on the scene until late in the night.

On July 2 the battle was not resumed until four o'clock in the afternoon. Sickles with the Union left wing held the base of Round Top, which lies south of Gettysburg, and opposite him was Longstreet. Here occurred the principal fighting of the day, the Federals being forced back with dreadful carnage. Meanwhile, Early's attack on the Union center from the north was repulsed, after a hand-to-hand fight with stones and cudgels, and Ewell gained Culp's Hill, southeast of the town, which the Confederates held during the night.

At daybreak of the third day the Federals began a bombardment of Culp's Hill, which they carried after four hours. There was a cavalry engagement east of Rock Creek, and then occurred Pickett's charge on Cemetery Ridge, the most famous work of the entire battle, preceded by a cannonade lasting an hour and a half, the heaviest in American history. Fifteen thousand of Longstreet's corps, under Pickett, advanced against the center of the Federal line on Cemetery Ridge. These men had rushed into a veritable death trap, and, when a remnant of their number finally returned to Seminary Ridge, the battle was over and Lee retired, beaten, to Virginia. Gettysburg was the supreme moment of the war, and after it the fortunes of the Confederates gradually failed. The loss in number of killed, captured or wounded reached 50,000, each side suffering about equally. See CIVIL WAR IN AMERICA. Consult Doubleday's *Chancellorsville and Gettysburg.*

Geyser, *Gī' ser,* an eruptive hot spring. The true geyser rises through a funnel-shaped formation, its underground tube communicating with the source of water supply and on the surface terminating in a basin formed by the deposition of siliceous matter which has been held in solution in the water. The most beautiful and fantastic designs are often formed about the mouth of the geyser by these deposits of silica and carbonate of lime. The eruptions of geysers are intermittent, those of the smaller springs being the more frequent. The larger geysers, while spouting at rare intervals, are active for longer periods than the smaller springs. Numerous theories have been advanced to account for the appearance of geysers. That of Bunsen is generally accepted. It holds that by seepage from the surface the geyser source becomes filled with water, which at some great depth is heated by subterranean fires. When the water in the lower part of the tubular column reaches the boiling point, the expansion of steam forces upward to the outlet the column of water in the funnel, with sufficient pressure to send a stream high into the air.

Among the greatest geysers in the world are the Great Geyser of Iceland, those of Yellowstone Park and of North Island, New Zealand. There are no less

A GEYSER IN ACTION

than 70 eruptive geysers in Yellowstone Park, the most remarkable of which are the Giant, which spouts a column of water and steam 5 ft. in diameter and 200 ft. in height, sometimes for an hour and a half at a time, and Old Faithful, noted for the regularity of its eruptions. See YELLOWSTONE NATIONAL PARK.

Gey'serite, a silicate containing a varying amount of water, deposited about the geysers and hot springs of Montana, Yellowstone Park, New Zealand and Iceland. It has a variety of colors, and forms in hard masses or in beautiful structures resembling cauliflower.

Ghats, *Gots,* the name of two mountain ranges of India, bordering the coast and enclosing the great central tableland. The two ranges tend to converge at the south but lose their distinctive features in the Plateau of Mysore. The Eastern Ghats consist of disconnected groups of mountains having an elevation of from 1500 ft. to 2000 ft. They extend for nearly 500 m. in a northeasterly-southwesterly direction, and are cut by the Kistna and other lesser rivers.

The Western Ghats are much longer and are higher, being generally from 3000 ft. to 5000 ft. in elevation and having one group in the south that reaches a height of 8760 ft. These mountains are rugged and barren in the main, but have some fine forests of bamboo, teak and rattan. The Pass of Palghatcherie forms an abrupt break in this chain.

Ghent, Treaty of, a treaty of peace concluded between British and American commissioners assembled at Ghent, Belgium, in 1814, at the close of the War of 1812, and ratified by Congress Feb. 17, 1815. It provided for universal peace between the belligerents, the mutual restoration of territory to its former position at the beginning of the struggle, the appointment of commissioners to settle certain boundary questions in accordance with the Treaty of 1783, and bound both governments to attempt the abolition of the slave trade. It said nothing, however, of the impressment of seamen, the search of American vessels and the oppressive decrees respecting neutral commerce, the three grievances which were the main causes of the war. See WAR OF 1812.

Ghiberti, *Ge ber' te,* **Lorenzo** (1378 1455), an Italian goldsmith and one of the leading sculptors of the early Renaissance, was born at Florence. His chief work, which is also one of the chief monuments of early Italian art, is a set of bronze doors of the Baptistery, Florence, for which work he was chosen after competition with Brunelleschi, Japoco della Quercia and Niccolò d'Arrezzo. The surface of the doors is divided into panels, upon which are small reliefs representing the life of Christ and events and characters connected with the Church.

Ghirlandajo, *Ger" lahn dah' yo,* **Domenico** (1449-1494), the most important member of a celebrated family of Florentine painters. The most famous of his frescoes are in the Tornabuone Chapel, Santa Maria Novella, Florence. They represent the *Life of John the Baptist, Legend of the Virgin,* the *Annunciation, Four Evangelists* and other Church figures. His work is full of dignity and is the most realistic of his century. He was, above all his compatriots, the painter of Florentine life.

Ghost, the apparition of the spirit of a dead person appearing or seeming to appear in bodily form. The belief in ghosts has been held by all races of people and with most has some relation to religious beliefs. Its origin seems to be coexistent with that of belief in the life of the soul apart from the body, and may have come about through the seeming impossibility of conceiving of a soul without physical attributes. The mystery which surrounds death and the particular terror which seems to attach to violent death have been the source of many of the ghost stories and tales of haunted houses once common. Since ghosts, in the nature of things, could not be examined, all kinds of powers, impossible in the physical world, were attributed to them.

Though the belief in ghosts still survives to a certain extent, it is by far less common than in earlier times, when few localities were without their haunted house or their ghostly visitants. Among the famous agitations concerning ghosts, the most widely known is that of the Cock Lane Ghost at Clerkenwell, England, in 1762. The ghost seemed to make itself manifest by rappings about the bedside of a young girl living in Cock Lane. The whole affair was finally proven to be a conspiracy for the purpose of convicting an innocent man of the murder of his wife. Dr. Johnson's account of the incidents occurring in connection with the mystery may be found in the *Gentleman's Magazine,* Volume 32, pages 32-81. Probably the most famous ghost of fiction is that of Hamlet's father in Shakespeare's well-known tragedy.

Giants, in Norse myths, huge creatures born among the icebergs. The first of these was Ymir, who, slain by the gods, drowned in his blood all his descendants save one couple. These two fled to the polar region, Jotunnheim, where they propagated another race. Typifying evil, the belligerent forces of cold, ice, snow, stone and underground fire, the giants were continually being warred against by the gods, by whom they were usually outwitted; for the giants were clumsy in mind and in body; besides, they had only stone weapons.

Giant's Causeway, a celebrated promontory rising from the northern coast of County Antrim in Ireland. It varies in thickness from 300 to 5000 ft. and is formed by the tops of about 40,000 basaltic columns. The columns are from 15 to 20 inches in diameter, are six-sided, fit closely together and are nearly equal in height. The causeway is about 300 yards in length, and is in three divisions, the Little Causeway, the Middle Causeway, or Honeycomb, and the Grand Causeway. The pillars of the Little Causeway display a variety of forms, some being hexagonal prisms, others octagons and pentagons. In the Grand Causeway a fan-shaped arrangement of columns is called the Lady's Fan. Another formation is called the Wishing Chair because of its resemblance to a seat. The Giant's Well and the Giant's Loom are similarly named from their likeness to these articles. The formation of the

causeway is attributed by ancient legend to giants, who were believed to have commenced the building of a roadway across the channel from Ireland to Scotland. See BASALT; FINGAL'S CAVE.

Gib'bon, the lowest ape of the Simian Family. The members of this genus are distinctly arboreal, or tree-dwelling, in habit, and are small, active creatures but are unusually awkward in appearance. Their arms are of such length that even when the gibbon stands upright, they are able to touch the ground. The brain is very small, but not proportionately smaller than that of other apes. The gibbon is found in southeastern Asia, where there are several species.

Gibbon, Edward (1737-1794), an English historian, born at Putney on the Thames. He studied at Oxford, was converted to Catholicism in 1753, but, through the influence of his father and a Calvinist minister, he readopted Protestantism some 18 months later. Subsequently he renounced all forms of religion. His private studies were wide and varied, and in seclusion he amassed a fund of knowledge, almost unparalleled, which a retentive memory turned to good use in the scholarly productions that he afterwards published. His first attempt was a study of literature, a brief essay, appearing in 1761. After serving as colonel in the Hampshire militia, he visited the Continent, and upon crossing the Alps and going to Rome he first began to plan his great work, the history of the Roman Empire. The work was begun in 1772, and the first volume appeared four years later; the last three volumes were published in 1788. *The Decline and Fall of the Roman Empire* represents one of the great achievements of mental enterprise and of erudition. Considering the scope of the work, its accuracy is extraordinary, and the sustained brilliance of style, the dignified treatment, the constant recourse to original sources, mark it as a marvelous history of the civilized world through 13 centuries, a stupendous task done with the consummate skill of a historian preeminently fitted for the duties. A misleading gauging of the relation of events, overemphasis of the influence of paganism and attacks on Christianity are the gravest charges against it.

Gibbons, James (1834-1921), a Roman Catholic prelate, born in Baltimore and educated at St. Charles's College, Maryland, and St. Mary's Seminary, Baltimore, where he was ordained priest in 1861. He served as assistant at St. Patrick's, Baltimore, for a few months, when he became pastor of St. Bridget's, Canton, a suburb of Baltimore. Later he was secretary to Archbishop Spalding and chancellor of the arch-diocese. In 1866 he was appointed assistant chancellor of the Second Plenary Council of the American Roman Catholic Church. Two years later he became vicar apostolic of North Carolina, with the rank and title of Bishop of Adramyttium. He was transferred to the See of Richmond in 1872. In 1877 he was appointed Archbishop of Baltimore and in 1884 presided at the Third National Council held in that city. In 1886 he was named cardinal and in June of that year was invested with the insignia of the office, being the second American upon whom this high honor was conferred. As senior cardinal, he was at the head of the Roman Catholic Church in the United States. Cardinal Gibbons was the author of *The Faith of Our Fathers, Our Christian Heritage, The Ambassador of Christ* and a volume of popular sermons.

Gibraltar, *Jib rol' ter,* a British fortress and colony, situated near the southern extremity of Spain at the western entrance to the Mediterranean. A low, sandy isthmus connects it with the mainland, and the Rock itself, nearly three miles in length, rising 1400 ft. above sea level, consists chiefly of gray limestone. Its sides are steep, except to the west, where the town is situated on its slopes; along the crest are the famous Rock gun, the signal station, O'Hara's Tower and Windmill Hill. The town of Gibraltar is situated at the northwestern corner of the Rock, fronting the bay, only a small part of it extending over level surface and several

of the streets ending in rough stone steps. The old buildings were destroyed during the siege of 1779-1783, and among modern structures are the "convent," the Anglican Cathedral, the civil hospital, the garrison, library, the courthouse, exchange buildings, naval and military hospitals.

Since 1705 Gibraltar has been a free port except in point of alcoholic liquors and tobacco. Several thousand men are employed in its chief business—the coaling of passing steamers. Wine is the principal export, and the main sources of wealth are revenues, port and harbor dues. The harbor has been extremely improved by new dockyard works, three large moles enclosing its 440 acres. Gibraltar was formerly known as one of the "Pillars of Hercules," and among the Greek and Roman geographers as Calpe. Its military history dates back to its capture and fortification by the Saracen leader, Tariq, in 711. The Spaniards took possession of it in 1462, and in 1502 it was incorporated with the domains of the Spanish Kingdom. In 1704 it fell into the hands of the British and Dutch. The memorable siege of 1779-1783, one of the most remarkable in history, ended in the defeat of the Spanish and French forces; since that period the history of Gibraltar has been comparatively uneventful. It is now a crown colony with little local government. Population in 1901, 27,460.

Gibraltar, Strait of, the channel connecting the Atlantic Ocean and the Mediterranean Sea and separating Spain from Morocco. It is about 36 m. long, has an average depth of about 900 ft. and varies in width from 9 to 13 m. There is a continual central current entering from the Atlantic and on both shores is an ebb and flow of tidal currents. An undercurrent setting towards the ocean is thought to carry off surplus waters of the Mediterranean.

Gibson, Charles Dana (1867-), an American illustrator, born in Roxbury, Mass. Following the publication of his *Collection of Eighty-four Drawings* in 1894, he enjoyed for a decade or more a popular favor unequaled by that of any other contemporary American artist. His fame rests chiefly upon his representation of a type of American womanhood, known as the "Gibson Girl," whom he portrays in every imaginable situation.

Gibson, John Morison (1842-), a Canadian statesman, born in Ontario and educated at Toronto University. For many years he practiced law at Hamilton, being a leader of the provincial bar. A Liberal, he sat for West Hamilton and for East Wellington from 1879 to 1905, meanwhile being successively provincial secretary, commissioner of crownlands and attorney-general. Subsequently he sat in the Ross government, without portfolio, and in 1908 he became lieutenant-governor of Ontario.

Gid'dings, Franklin Henry (1855-), an American sociologist, born at Sherman, Conn. He graduated at Union College in 1877, and for a number of years wrote for newspapers on the subjects of politics and economics. He then became lecturer and professor of political science at Bryn Mawr College, and in 1894 was elected professor of sociology in Columbia University. Professor Giddings maintains that it is the province of sociology to deal with the elements and first principles of society. He attempts to explain social phenomena primarily by psychical forces, such as the "consciousness of kind," rather than merely in terms of environment. Among his chief works are *Principles of Sociology, Elements of Sociology, Democracy and Empire* and *Inductive Sociology.*

Giddings, Joshua Reed (1795-1864), an American statesman, famed as a moderate abolitionist of slavery. Born in Pennsylvania, he served in the War of 1812, taught school and practiced law, entering the Legislature and Congress, where he advocated the abolition of slavery in the territories. For a strong speech to the effect that slaves had a right to use any means whatsoever to gain their freedom, he was censured, and resigned, but, being reelected, was a

leading opponent of slavery until the Civil War.

Gid'eon, the fifth of the judges of Israel, son of Joash. He came into prominence in a time of general backsliding, when the Midianites were greatly oppressing the people of Israel. An angel of the Lord appeared to him while he was thrashing wheat to announce that he was called to deliver the people, and, subsequently, with 300 of the bravest of the Israelites, each armed with a sword, trumpet and earthen pitcher containing a lamp, he gained a decisive victory over the great host of the enemy. Gideon lived 40 years longer, during which time the country was at peace. See *Judges vi-viii.*

Gila, *He' la,* a river of southwestern United States, rising in western New Mexico and flowing in a westerly direction through New Mexico and across Arizona. Its length is about 130 m. and it enters the Colorado River near Yuma in the southwestern part of Arizona. The course of the river lies in an arid desert region occasionally interrupted by mountains and plateaus. Silver and gold are mined in the Gila Valley, and the ruins of ancient cities, as well as the modern cities of San Carlos and Florence, mark its course. Its principal tributaries are the San Pedro, the Santa Cruz and the Rio Verde.

Gila Monster, a lizard of the Heloderm Family found in Arizona and New Mexico and comprising the only group of poisonous lizards known in the United States. Its body is generally about 20 inches long and is covered with beadlike irregularities, its color is unevenly marbled with black and pink or yellow spots. This lizard is particularly vicious in disposition and snaps its cruel jaws at the slightest provocation. The teeth, at the base of which lie the venom sacs, are grooved and direct the course of the poison to the wound made by the bite. Their food consists of eggs and small reptiles, and the tail, like the hump of a camel, is the reservoir of its extra food supply. Ordinarily the bite of the Gila monster is not fatal. See LIZARD.

Gilbert, Sir William Schwenck (1836-1911), an English dramatist, born in London. From journalism he turned his attention to comic opera, and in collaboration with Arthur Sullivan produced a series of fantastic burlesques which have enjoyed enduring popularity. Best known are *H. M. S. Pinafore, The Mikado, The Pirates of Penzance* and *The Gondoliers.*

Gilder, Richard Watson (1844-1909), an American poet and journalist, born in Bordentown, N. J. He served for a time in the Civil War, later engaged in editorial work and became assistant editor of *Scribner's Monthly,* taking the editorship of this periodical in 1881, when its name was changed to the *Century.* Besides taking an active interest in public affairs, he published several volumes of poems. These include *Lyrics, Five Books of Song, Poems and Inscriptions* and *In the Heights.*

Gilding, the process of covering a surface with a thin layer of gold. The oldest and best method consists in applying a fine gold leaf to a surface which has been treated to a size, which, when partly dry, allows the gold to adhere. Gold dust or powder is also used for surfaces. The frames of mirrors, pictures and moldings are gilded by the application of gold leaf or by using tin foil or silver leaf, with a yellow varnish afterwards applied. The edges of books are gilded by coating with dextrine or mucilage and applying the gold leaf, and afterwards polishing. Metals can be gilded by coating with an amalgam of gold and mercury and applying heat, which drives off the mercury, leaving a coating of gold, which is then varnished. In gilding glass, china, pottery, etc., gold powder is mixed to form a paint, and after giving them a coating the articles are baked in an oven at a low temperature. It is then fixed in a kiln at high temperature. After cooling, the gilding is burnished.

Gilia, *Jil' i a.* See PHLOX.

Gillette, *Jil let',* **William Hooker** (1855-), an American actor and playwright, born in Hartford, Conn. He

studied at the universities of New York and Boston while playing in stock companies in those cities, and later met with success in the South and West. In recent years he has taken part in plays written by himself, among which are *The Private Secretary, Esmeralda, Secret Service* and *Sherlock Holmes.*

Gil'man, Daniel Coit (1831-1908), an American educator, born at Norwich, Conn. Graduating at Yale in 1852, he spent some time in study and travel in Europe. From 1856 to 1872 he held important positions at Yale, resigning there to accept the presidency of the University of California. He left this institution in 1875 to become the first president of Johns Hopkins University at Baltimore; and retired from this position in 1901 to become the first president of the Carnegie Institution at Washington. He was an exceptional judge of men, was quick to recognize workers in new branches of science and was an able administrator. He was an original member of the General Education Board, and was a trustee of the John F. Slater Fund, the Peabody Education Fund and the Russell Sage Foundation. For six years he served as president of the National Civil Service Reform League, and in 1893 became president of the American Oriental Society. He wrote *The Launching of a University, University Problems in the United States* and other valuable works.

Gin, *Jin,* an alcoholic liquor compounded from distilled grain and flavored with coriander seeds, angelica roots, juniper berries and various essential oils. It contains from 40 to 50 per cent of alcohol. Gin is known as dry when unsweetened. It is made principally in Plymouth, England, and Schiedam, Holland. Cheaper grades were manufactured in the United States. See WINE.

Gin, as used in machinery, is the term applied to a device for hoisting weights, principally from shafts in mines. In its simplest form it consists of three poles of equal lengths fastened together at the top, and with the bottom of the poles spread apart to form a tripod. From the top is supported a tackle block with a pulley, over which a rope is passed to haul up loads. Subsequently a windlass was added to this contrivance and attached to an upright shaft, with gearing so arranged that a traverse beam could be carried around as a sweep by animal power, and hoist loads.

Ginger, *Jin'jer,* a plant or a product of a plant of the Ginger Family, valuable as a spice. It is a grasslike herb cultivated in the East Indies and elsewhere in the tropics for the large, thickened roots which yield commercial ginger. The stems are cylindrical and sheathed by the bases of the long, narrow leaves something in the manner of our Indian corn. The flowers are clustered in a leafy head and are highly colored. There is a small, sheathing calyx surrounding a tubular corolla, which has three long, pointed lobes. The flowers are particularly noticeable because one of the stamens is broadened at the top into a flat lip which bends over the lobes of the corolla.

The roots are dug for drying as soon as the leaves wither, generally in about nine or ten months after planting. If the ginger is to be exported dried, it is soaked in water, peeled and dried for a week. If preserved, it is boiled and dipped in sirup every 24 hours for a week. It may be found in our markets in both forms. Probably most of our preserved ginger is imported from China.

Wild ginger is a low, woolly herb of the Birthwort Family, growing in woodlands throughout the United States. It has a thickened underground stem and long-stemmed, rounding leaves which have velvety surfaces and are inclined to be of purple-brown color underneath. The flowers are inconspicuous, being low, nodding blossoms that hide under the leaves and do not differ from them in color. There are no petals, and the calyx is a three-parted cup whose divisions spread broadly. The root of the wild ginger provides a popular remedy for measles and whooping cough.

Ginseng, *Jin' seng,* a Chinese herb of the Ginseng Family and valued in China for a drug obtained from its roots. The name ginseng is the corruption of a Chinese word meaning manlike and refers to the shape of the root, whose likeness to the human form caused the Chinese to believe it had occult curative powers. The plant has straight, slender stems and broad leaves, whose five leaflets extend from the top of the leafstalk. The flowers are a bunch of small, clustered blossoms, growing upon a slender, naked stem and followed by small, scarlet berries. The root, which has a pleasing odor and a sweet taste, is large and thick; the value of the plant depends upon the size and quality of this root; thus ginseng growers give especial attention to aids to its better production.

Ginseng grows plentifully in China but the demand greatly exceeds the supply, since it is there used for almost every conceivable household purpose as well as for medicine. The wild ginseng was discovered in America early in the 18th century, and roots were almost immediately exported. The trade became so profitable that ginseng is now cultivated in large tracts to be shipped to Chinese exporters at American ports. At present it is grown in many states east of the Mississippi and north of Georgia. Almost the entire crop is sent to China, where extremely high returns are procured.

Giordano, *Jor dah' no,* **Luca** (1632-1705), an Italian painter, born at Naples. His father was an artist of little reputation who taught his son the elements of his art. When but eight years of age, Giordano painted a cherub into one of his father's pictures, and for this he acquired early notoriety. His rapidity of execution earned for him the title of Luca Fa-Presto (Luke Work-Fast), from the constant injunction of his father, greedy for the price of his paintings. Giordano studied in Rome and in many other Italian cities. In 1687 he went to Madrid, where he remained for 13 years at the court of Charles II. He left many works, most of which are remarkable for their brilliant, showy color. Some of those best known are *Christ Expelling the Traders from the Temple, Moses and the Brazen Serpent, The Judgment of Paris* and *Christ with the Doctors in the Temple.*

Giorgione da Castelfranco, *Jor jo' na dah Kas" tel frahng' ko,* (about 1478-1511), one of the greatest Italian painters of the Venetian School, born at Castelfranco, near Treviso, of humble parents. In early boyhood he went to Venice, where he became a pupil of Giovanni Bellini. He was a person of social charm and distinguished bearing, a romantic figure and a musician. In 1500 he was commissioned to paint portraits of the Doge Agostino Barberigo and the Condottiere Consalvo Ferrante; four years later an altarpiece at Castelfranco, and in 1507 the Hall of the Audience of the ducal palace. Besides these important engagements he decorated in fresco numerous Venetian palaces. One of the most important events of his life was his meeting with Leonardo in 1500, when the Florentine artist visited Venice. He died of plague at the age of 33, in the full splendor of his powers. Of the 150 paintings attributed to him, only a few are of unquestioned authenticity. Among those which documentary evidence ascribes to him are an altarpiece of the Cathedral of Castelfranco; the *Family of Giorgione* (Venice), an idealistic group in a landscape setting; *Three Eastern Sages* (Vienna); *The Concert,* in the Pitti Palace; *Christ Bearing the Cross,* owned by Mrs. Jack Gardner of Boston; and the *Sleeping Venus,* at Dresden. The last of these is generally considered to be the most chaste and exquisite representation of Venus in the art of the Italian Renaissance.

Giorgione's position in Venetian art is analogous to that of Leonardo in Florentine art. He freed it from the conventional and rigid formulas and traditional shackles of his predecessors. With both, the picture was the apotheosis of the idea behind it, and detail was subordinated to general effect. Many of his pictures tell no story, but embody a mood and appeal

to the highest artistic sense through beauty alone. "He achieved a full expression in art of phases of the splendor, charm, grace and poetic melancholy of the Venice of his day."

Giotto di Bondone, *Jot' to de Bondo' na,* (about 1267-1337), an Italian painter and architect, born at Vespignano, near Florence. There is a legend that he attracted the attention of Cimabue, who first saw him drawing his father's sheep upon a slate by means of a sharp stone, and thereupon took the lad as his apprentice. The legend, however, has little foundation, and it is more probable that his training came from other sources. Giotto's great work has been the vitalizing of Italian art; it is said of him that "it is his glory to have been the first among his countrymen to breathe life into wall pictures and altarpieces, and to quicken the dead conventionalism of inherited practice with the fire of natural action and natural feeling." He prepared the plans for the beautiful Campanile of Florence, known as Giotto's Tower. His pictures are mostly religious in theme, and his figures have a grace of form and coloring that make them especially appealing. Some of his frescoes are still to be seen at Rome and at Assisi, and on the walls of the Chapel of the Arena at Padua. Among his best-known works are the four allegorical frescoes in honor of St. Francis and scenes from the life of Christ.

Giraffe, *Ji raf',* or **Camel'opard,** the tallest of ruminating animals and one of the two members of the Giraffe Family. It is found in central Africa, where herds of them are still numerous, but was formerly known throughout the entire continent. The extraordinary height of the giraffe is due to the lengthening of the vertebræ of the neck and not to any increase in their number. This also gives the forelegs an appearance of great length, though they are really no longer than the hind legs. The body slants from the long neck to the tail, and the reddish, spotted coat is sleek and silky. In order to drink or to crop grass the giraffe must spread its forelegs wide apart in an ungainly attitude, but when feeding on the twigs and leaves of trees it presents a graceful figure. Between the ears is a pair of skin-covered projections, the rudiments of horns lost in the course of evolution; the tail is tufted like that of a cow. It can run swiftly with a rocking camel-like gallop.

Girard, Stephen (1750-1831). Shipmaster, merchant, banker and philanthropist, born at Bordeaux, France. He left home at the age of fourteen as a cabin boy on a ship of which he was part owner, the gift of his father. Ten years later, as master of a ship, he entered New York. In 1776, he was forced into Chesapeake Bay to escape capture by a British ship. Having to abandon the sea, he entered business in Philadelphia and afterwards amassed great wealth as a banker and became the financial advisor of the United States during the War of 1812.

When he died his fortune was the greatest in America at that time, being about $7,500,000, the larger part of which was left to Philadelphia for civic improvements and to found the college known by his name.

Girard, *Ji rard',* **College,** at Philadelphia (1848). Established by a bequest of Stephen Girard, it was originally intended for the education of poor boys, and the age of admission was between six and ten years and the age of leaving between 14 and 18. Later the scope of the work was greatly extended to meet growing educational demands. The college fits its students for entrance to the leading American colleges and also provides thorough training in the industrial arts. The college is under the management of a board of trustees appointed by the judiciary of Pennsylvania. The original bequest of $2,260,000 has been increased until the institution now controls property exceeding $23,000,000 in value. The enrollment is over 1700.

Girondists, *Ji ron' dists,* the party of moderate republicans in the French Revolution. The name was derived from the Department of Gironde, whose deputies were the recognized leaders of the party,

and they constituted the most notable group of men in the Legislative Assembly which convened in 1791. They were able orators and succeeded for a time in controlling the Assembly; but they lacked the definite and determined policy of their rivals, the radical Jacobins, and were overthrown by them, all of their prominent leaders being executed in 1793. See JACOBINS; FRENCH REVOLUTION.

Glace, *Glas,* **Bay,** a city of Canada in the Province of Nova Scotia, on Glace Bay and the Sydney & Louisburg Railway, 14 m. n.e. of Sydney. The city is connected with Sydney by an electric railway. It is the center of a coal-mining region. Among the important buildings are hotels, banks, churches and schools. Mining and fishing are carried on and the city contains machine works and a woodworking factory. The annual production of the coal mines amounts to about 3,000,000 tons. A little to the southwest of Glace Bay is a station of the Marconi Wireless Telegraph, from which the first message from Canada to England was dispatched on Dec. 21, 1902. Population in 1911, 16,562.

Glacial, *Gla' shal,* **Period** (or the Great Ice Age), a name used to designate the period of geologic time occurring during the first part of the Quaternary, when, in the Northern Hemisphere, glacial conditions prevailed similar to those existing at the present time in the Arctic regions. Northern Europe, the British Isles and the northern half of North America were covered with ice, in places several thousand feet thick, which was intermittently accompanied by intense cold. Glaciers are never stationary, but move continually; and the ice mass of North America traveled southwestward and southeastward, except the parts over what is now Canada, which moved northeastward. Quantities of material, such as boulders, trunks of trees and fossil remains, were transported by the action of the ice, and New England, Long Island, Canada, New York and the states southwest as far as Iowa are thickly covered with foreign matter deposited in this way. This material is commonly called drift. In some places the ice sheet excavated lake basins, in others, channels for streams, and in the basin of the Mississippi it pulverized the rock into soil, so that the high degree of fertility of much of that region is due in no small degree to the results of the Glacial Period.

The cold of the Glacial Period was probably due to a variety of causes acting interdependently. Among the theories advanced is the one to the effect that the continents affected were at the time on a higher level above the sea, and that the land interfered with oceanic circulation and that vertical circulation of the air was affected; that lack of moisture and carbon dioxide in the atmosphere reduced the temperature of the heat envelope around the earth; and that the average temperature of the earth's surface was reduced and redistributed. See GLACIER; GEOLOGY.

Glacier, *Gla' sher,* an icy mass composed of both ice and snow, covering the lands of the Far North and the sides of mountains above the snow line. These great ice fields move from 18 to 24 inches in a day and sometimes approach the limits of warmer zones. Their surfaces are marked by fissures, or crevasses, and along their extremities and sides are piled heaps of rock and earth, as a snow plow leaves the heaps of snow along its track; these mounds are known as moraines and are *lateral* or *terminal* according to their formation by the sides or ends of the glacier. Some of the most remarkable glaciers are those of the Alps; the Mer de Glace on Mont Blanc lies 5700 ft. above sea level. The Andes, the Himalayas and the mountains of northern Europe are also covered with glaciers of vast extent.

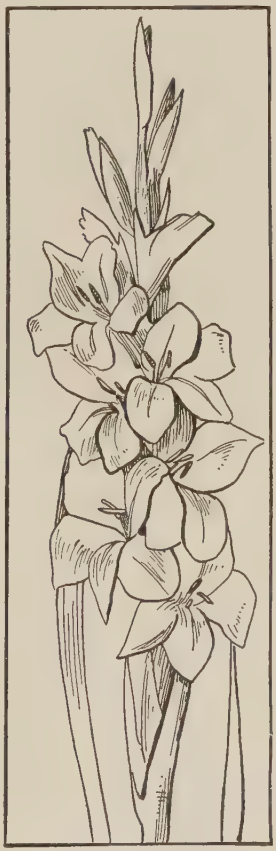
The glaciers of Alaska are the largest on the American continent. A vast one on Mt. Fairweather is far larger than those of the Alps (See FAIRWEATHER, MOUNT). Others of nearly equal size and grandeur are the Malaspina, the Valdez and the Muir. See GLACIAL PERIOD.

Glacier National Park, a national park located in the northwestern part of Montana. It has an area of 1400 sq. m. and was set aside as a park by the government because of the beauty and grandeur of its scenery. Within its boundaries are 250 lakes, ranging from 10 m. to a few hundred feet in extent; and 60 glaciers, of which Sperry Glacier is the best known. Snow-covered peaks, wild gorges, dense forests and clear streams with numerous cascades are striking features of the scenery. The park is a game preserve and contains many wild animals. The summit of Cutbank Pass is literally the top of the North American continent. At this point one can dip water from Cutbank Creek and pour it out so as to send it to Hudson Bay, to the Pacific or to the Atlantic.

Glad'den, Washington (1836-1918), an American clergyman and author, born in Pottsgrove, Pa., and educated in Oswego Academy and Williams College. In 1860 he was ordained to the Congregational ministry, and became pastor of the State Street Congregational Church in Brooklyn, N. Y. He was also pastor at St. Albans, Vt., at North Adams and Springfield, Mass., and at Columbus, Ohio. He was one of the editors of the *Independent* for four years, from 1871, and for two years was editor of the *Sunday Afternoon*. Mr. Gladden is the author of *Young Men and the Churches, Workingmen and Their Employers, Social Salvation* and many other valuable books.

Glad"ia'tor, a person who fought with weapons in an arena. The first gladiatorial combats are said to have taken place at funerals and may have developed from the custom of offering human sacrifices at the burial ceremonies. For a long time captives, criminals and slaves were the contestants, and throngs crowded the arenas to witness the combats. Schools for the purpose of training the gladiators flourished and contests of various kinds were arranged, as between men and beasts, two men or two parties of men. They generally fought without other protection than small shields, and the weapon used was usually a small dagger. If a gladiator was wounded and asked for mercy, he held up his hand, but if the populace in response held their thumbs down, a sign that no mercy was granted, he must continue to fight until he could defend himself no longer. The combats were brutal and appealed to the low traits of the people, but were popular in Rome through several centuries.

Gladi'olus, a stately plant of the Iris Family. It is commonly grown in conservatories and flower gardens for its spike of showy crimson, white or yellow flowers. The stem is straight and leafy, the leaves sword-shaped and the flowers somewhat irregular. The lower blossoms of the spike open first, disclosing a funnel-shaped tube with unevenly divided lobes streaked with darker shades. Florists are constantly producing new varieties. A blue gladiolus is a recent production. The cultivated varieties have spikes sometimes growing to a height of six feet, and produce large blossoms that are very ornamental.



GLADIOLUS

Gladstone, William Ewart (1809-1898), an eminent British statesman and orator, born in Liverpool. His ancestors having lost their estates in the Scottish lowlands, his father, John Gladstone, went to Liverpool, where he became one

of the merchant princes of the city, a baronet and a member of Parliament. William was educated at Eton and at Christ Church, Oxford, graduating in 1831 with the highest honors in classics and mathematics. After spending six months in Italy studying art, he entered Parliament early in 1833, where for more than 50 years he gave himself to the public service of his country.

Gladstone's unusual ability as a debater had become evident in college and gained immediate recognition in Parliament. In 1835 he became junior lord of the treasury under Sir Robert Peel. In 1841 he was made vice-president of the Board of Trade, and turned his attention to the field of national finance, in which he subsequently became so famous. Two years later he succeeded to the presidency of the Board of Trade, and entered the cabinet at the age of 33. In 1845 he was secretary of state for the colonies in Sir Robert Peel's cabinet; but during this period of two years was not a member of Parliament. He was returned to Parliament, however, in 1847, as one of the two members for the University of Oxford.

The next three years constituted a period of mental growth and transition, as Gladstone gradually swung away from his old political moorings in the Conservative Party toward Liberalism. In 1852 he came into still greater prominence as a debater by his vigorous speeches against the budget of Disraeli, which caused the overthrow of the ministry and established his reputation as the leading financier of the day. In the new cabinet he was made chancellor of the exchequer under Lord Aberdeen, a position for which he was eminently fitted by his combination of financial, administrative and rhetorical gifts.

In 1858 he went as high commissioner to the Ionian Islands. He became chancellor of the exchequer again in 1859, under Lord Palmerston, and was by far the most brilliant and conspicuous figure in the cabinet. Lord Palmerston died in 1865, and Gladstone, retaining the chancellorship of the exchequer under the new ministry of Lord Russell, became leader of the House of Commons; and upon the retirement of Lord Russell from political life in 1867, he became the recognized leader of the Liberal Party, with which he had by this time fully identified himself. In 1868 the Liberal Party returned a large majority to Parliament, and Gladstone became prime minister. The Liberals were defeated in 1874 and he resigned; but in 1880 they were returned to power, and Gladstone became prime minister for the second time, remaining in office until 1885.

In 1886 he became premier for the third time, and soon startled the country by the introduction of a Home Rule bill for Ireland and a bill for buying out Irish landlords. His policy was defeated in the general elections that ensued, and he made way for Lord Salisbury. The general elections of 1892, however, resulted in a majority of 40 for Home Rule, and Gladstone became prime minister for the fourth time, at the age of 83. His new Home Rule bill passed the House of Commons in 1893, but was thrown out by the House of Lords. He regarded his political work as now completed, and made his last speech in the House of Commons on March 1, 1894, soon afterwards presenting his resignation as premier, but retaining his seat in Parliament until its dissolution in 1895, when he retired to private life at Hawarden. Upon his death three years later he was buried in Westminster Abbey with every mark of popular respect and affection.

The English legislation of half a century was identified with Gladstone's name. Through his efforts, among other measures, a school system was adopted establishing boards of education in each district; the Irish Land Act was passed, for the relief of Irish tenants; compulsory Church rates were abolished and religious tests in the universities eliminated; the English Church was disestablished in Ireland; appointment to the army and navy by merit was substituted for the purchase of commissions; the franchise was greatly extended, and the

secret ballot established; and Home Rule for Ireland was carried in the House of Commons.

Gladstone was a remarkable public speaker, being one of the leading orators of the Victorian reign. Tall and commanding in appearance, with a voice clear and melodious, possessing a memory that supplied him with facts down to the minutest detail, a master of wit and invective, clear and lucid in statement, quick and keen in repartee and debate, earnest, courteous and convincing in delivery, he always held the interested attention of his hearers, and presented his political and moral convictions with persuasive power.

Gladstone was a Conservative by nature and training. The new needs of the new age, however, forced him into the Liberal Party, where, often against his own natural sentiments, he advocated reform measures that changing conditions convinced him were necessary for the common good. He was deeply religious in spirit, and in executing his purposes seemed to have the conviction that eternal truth and right were on his side and must prevail, a conviction that greatly increased his forcefulness as a national leader.

In the midst of an unusually busy life, Gladstone retained his literary and scholarly interests, and found time for reading and authorship along many lines. Among his writings are *The State in Its Relations with the Church, Letters on the State Persecutions of the Neapolitan Government, Studies on Homer and the Homeric Age, The Vatican Decrees, The Irish Question* and *A Translation of Horace.*

Gland, in anatomy, a term applied to a secreting organ. A gland consists of a layer or group of cells resting upon a basement membrane and a network of nerves and blood vessels. All glands fall into two principal groups, true secreting glands and ductless glands. The secreting glands are either tubular, being merely depressions of mucous membrane lined with secreting cells, or saccular, consisting of an aggregation of sacs lined with epithelial cells arranged around a short tube, or duct, into which their secretion is discharged. The principal secreting glands of the body are: the lachrymal glands, or tear glands, of the eye; the mammary glands; the kidneys and pancreas; the submaxillary, sublingual, parotid and buccal glands, which secrete the saliva; the liver, the largest gland in the body; the sebaceous glands of the skin, numerous in the scalp, which provide an oily secretion; and the sweat glands, found all over the body.

The ductless glands are the spleen, the suprarenal capsules, and the thymus and thyroid glands. The suprarenal capsules are situated close to the kidneys, and secrete a substance called adrenalin, which has the power of stimulating the nerve fibers which control the muscles of the small arteries, causing them to contract and thus increasing the circulation of the blood. A diseased condition which interferes with their proper functioning results fatally. The thymus gland is situated in the chest. It is very large at birth, but rapidly decreases in size and sometimes seems to disappear altogether. In hibernating animals a large supply of fat, reserved for the period of seclusion, is stored up in this gland. The thyroid gland is situated in the throat. Common diseases of this gland are goiter, which usually occurs in adults, and cretinism, a condition causing insanity, and often present from infancy. See LIVER; PANCREAS; SKIN; SPLEEN.

Gland'ers, a bacterial disease common among horses. It is known in two forms, the acute and the chronic. In the former the affected animal usually dies in from three to eight weeks, while in the latter it may live for years and be only slightly affected until the disease suddenly changes to the acute form. The presence of the disease is marked by the hard lusterless condition of the coat, the formation of bunches that turn to ulcers under the skin of the thigh and shoulder, and an offensive discharge from the nostrils caused by the diseased condition of the lungs. The disease is spread by

means of infection from the discharges, and occasionally affects man as well as horses. At present no cure is known for it, but stringent laws are in effect in most states designed to prevent the spread of the disease.

Glasgow, *Glas' ko,* a city of Scotland, the largest of the country and next to London the largest in the United Kingdom, situated on both banks of the Clyde River. To the northwest the level ground, on which the main part of the city is built, rises in a series of irregular elevations. The streets are straight and wide and a good view of the river is obtained, with its bridges of light and attractive architecture. Buchanan Street separates the eastern, or old quarters, from the western part, which contains the fashionable residences. Most of the houses are built of white freestone. Among the old buildings is the Cathedral, begun in 1238, of early English architecture and elaborately decorated. Above it is the Necropolis with imposing monuments. Other edifices are the handsome new buildings of the university, the Royal Exchange, the Bank of Scotland, the Merchants' House, the General Post Office, the Institute of Fine Arts, the corporation galleries, the Mitchell Free Library and several colleges and technical institutions. There are statues of Queen Victoria and the Prince Consort, Sir Walter Scott, James Watt, Sir John Moore, Sir Robert Peel, The Duke of Wellington and William Pitt.

The industrial development of Glasgow is largely due to its geographical position at the mouth of the Clyde River, which gives it an excellent harbor, as well as to the heavy iron and coal deposits of the surrounding country. The commerce and manufactures are very significant. The exports include coal, chemicals, liquors, machinery and cotton, woolen and linen goods. The shipbuilding industry is the most important in the world, and here were built the celebrated "ocean greyhounds," the *Lusitania* and *Mauritania* and the larger *Olympic*. The constructing of all kinds of machinery, cotton spinning, weaving, dyeing, calico printing and brewing are the chief industries. The St. Rollox Chemical Works are known as one of the largest establishments of their kind in the world.

Glasgow has taken the lead in municipal activity and reform in the United Kingdom. There is a municipal council which divides into several subcommittees, these supervising the different departments of city administration. The city operates its own hospitals, tenements, lodging houses, public baths, sewage plant, waterworks, street cars, lighting plants, markets, slaughterhouses and harbor ferries. On all these investments it now gains a net profit. Glasgow was built as early as 560, and since the union of Scotland with England in 1707, its commercial growth has been very rapid. Population 1,072,793.

Glasgow, University of, at Glasgow (1450). It had an unsettled existence until the middle of the 18th century, when it became famous and for a time enrolled a large number of students. It soon deteriorated, however, and in the 19th century was reorganized on the plan of Oxford and Cambridge universities. The site was changed to more spacious grounds, and the new buildings were well planned and well equipped. The chancellor of the university is appointed for life, and the rector is chosen by the students every three years. There are departments of arts, medicine, theology, science and law, a library of 210,000 volumes and numerous museums and biological gardens. Queen Margaret's College and Muirhead College are for women. The average enrollment is 2000.

Glass, a common and usually transparent material made by melting together sand and some alkaline substance, such as potash, soda, lime or oxide of lead. When cold, glass is brittle, but it softens when heated, and at high temperature it can be molded into any desired form and drawn into fine threads suitable for weaving with silk.

VARIETIES. The different substances

used and the methods of manufacture employed give rise to numerous varieties of glass. Pure materials are essential to a good quality of glass, whatever the variety. Sand is the foundation of all kinds of glass, and is the most difficult substance from which to separate impurities. Iron is the most objectionable impurity, since it discolors the glass and makes it less valuable. Lime makes a hard, brilliant glass, but if too much is used, the glass is brittle. Potash makes a clear, transparent glass; soda imparts a green tint, seen in cheap bottles; oxide of lead makes a soft glass having a brilliant luster.

Window Glass. Window glass is made of sand, soda and lime. The American window glass is first blown in the form of cylinders. These are flattened, and the sheet thus formed is cut into panes.

Crown Glass is English window glass. It is blown in the form of a sphere, which is cut open and flattened, forming a circular sheet that is cut into panes. It is now but little used.

Colored Glass. Glass is colored by the oxides of different metals, which are added in small quantities to the ordinary ingredients. Iron gives all the rainbow colors, but its most common effects are orange and green. Manganese produces a pink or amethyst, but too high a temperature will turn it brown, then yellow, then green. Copper imparts a red to cheap glass, but when further heated it turns purple, blue and green. Cobalt produces a rich blue or a black. Gold in the form of purple of Cassius produces the finest ruby, also violet and amber. Tin produces white. By mixing these coloring matters, many beautiful tints can be obtained. Sometimes glass is colored by dipping a white glass into a colored one in a molten state. Colored glass is extensively used in church windows. The most elaborate designs are first painted on the glass, then the colors are baked or burned in. Glass prepared in this way is called stained glass.

Flint Glass, remarkable for its clearness and transparency, is made of sand of excellent quality and lime and alumina.

Plate Glass. This is the most expensive, as well as the most desirable grade of window glass, and is used in the large windows in stores and other public buildings. Its clearness and luster are due to the purity of the materials used in its manufacture and the high polish given the surface. It is made by pouring the molten glass on a table constructed for the purpose, and flattening the sheet to a uniform thickness with a roller. When cool the surfaces are polished. Skylight glass is a cheaper grade of plate that has not been polished.

Wire Glass. This is a variety of plate glass containing woven-wire netting. The netting is stretched just far enough above the surface of the table to place it midway between the surfaces of the sheet, and the molten glass is poured around it. Wire glass is used for basement windows and in other places where ordinary glass is liable to be broken.

Triplex Glass. This is a variety of glass recently invented in France. It consists of two plates cemented together with gelatin. The surfaces of each plate that are to face each other are covered with a thin coating of gelatin. These surfaces are then placed together with a thick sheet of celluloid between. The whole is then subjected to pressure in a hydraulic press to make the combination solid. The triplex glass thus formed is to all appearances as transparent as ordinary plate. If broken, the celluloid sheet prevents the fragments from flying. Triplex has all the advantages of wire glass with the additional advantage of being transparent.

Pressed Glass. This term is applied to glassware, that is, fashioned by pressing the molten glass in a mold, and does not apply to the quality of glass used. All the cheaper grades of tableware are of pressed glass.

Cut Glass. This is the most expensive glassware for table use. The articles are first cast in a mold, or blown, and have plain surfaces. A design is then marked

upon them, and this is cut into the glass by holding the object against a grindstone, shaped for the purpose. Water and sand continually drop upon the stone. The workman is guided by the pattern and his eye, and depends wholly upon his skill to produce the pattern. The grade of material, amount of labor and high degree of skill required in the manufacture of cut glass make this ware very expensive, and it often exceeds the price of silverware.

MANUFACTURE. *Furnace.* The furnace is the most important part of a glass factory. This may be circular or rectangular, and in either case is the base of a huge chimney. The fuel is commonly gas, either natural or made from coal. In order to melt the materials, they are either placed in fire-clay pots holding 1500 to 2000 lb., which rest upon a shelf, or the materials are melted in a tank of fire brick. For the glass that is to be blown, pots are generally used, while for pressed glass, the tank furnace is employed.

Preparation of Material. The sand and other materials are ground to a fine powder and intimately mixed in proper proportions, making what is known as a batch, and to this a small quantity of broken glass, or cullet, also ground fine, is added to assist in melting. When using pots it requires about 24 hours for the glass to melt. In tank furnaces the material is constantly added and the glass constantly withdrawn, making the process continuous.

Methods. The methods of shaping glass are pressing, molding and blowing. Window glass, bottles, vases, goblets and the finest tableware are made by blowing. The glass blower gathers on the end of a blowpipe, which is a straight iron pipe about four feet long, a quantity of melted glass, then by blowing, rolling and swinging the pipe he fashions the object, using also such tools as calipers, shears, etc. When blowing window glass, the glass blower stands over a trench several feet in depth, so that he may have more room to swing his blowpipe. He gathers on the end of the blowpipe a large mass, probably 25 lb. in weight, and by blowing and swinging the pipe he causes the glass to take the shape of a pear, and by holding the pipe upright and continuing to blow, and revolving the mass, he gets it into the form of a cylinder. Afterwards the ends are cut off, and the cylinder is scratched with a diamond, cracked open and put into a flattening furnace, when, as it becomes heated and softened, a workman flattens it by pressing it down upon a table. In this manner a pane of ordinary window glass is made.

Machinery for blowing and special devices for assisting in molding and rolling glass are used. In many operations blowing and molding are combined. See BOTTLE.

Annealing. All articles made from glass have to be carefully annealed to prevent breaking from change of temperature. The process consists of slowly heating the articles until they approach the melting point, and then cooling them very slowly. This is accomplished by passing the articles through a chamber, whose various compartments are heated to different degrees of temperature. When glass is cooled too quickly a hard surface is formed before the molecules inside the glass have time to become adjusted to the change of temperature. Pouring hot water into such a vessel or slightly scratching the surface will usually cause it to break into a number of pieces.

HISTORY. The invention of glass is probably due to the Egyptians, among whom glass is mentioned in 3300 B. C., made in the form of beads, vases, small figures, etc. The Phœnicians took up the art and introduced it among the Romans during the empire, though they had long before imported glass articles. After its decline in Rome, the manufacture was transferred to Constantinople, where it flourished during the Dark Ages. The Arabs obtained a knowledge of glassmaking about this time, and the glassware made at Damascus during the Middle Ages became quite celebrated. Mirrors, goblets and cups from Venice,

known as Venetian glass, became famous for their beauty over the entire world. Germany, France and England became noted later for their glassware. The first glass factory in the United States was erected at Jamestown, Va., in 1608, but now the chief centers of manufacture are located in Pennsylvania, New Jersey, New York, Ohio, Indiana and Illinois.

Glass Snake, a misnamed lizard of the Anguida Family and because of its invisible limbs often thought to be a snake. It is easily recognized as a lizard, however, because, unlike the snakes, it has well-developed eyelids and no ear openings. Its scales are so hard and glassy as to look as though newly varnished; in color they are green, brown or black. The body has a fold of skin on each side from head to tail. Like all lizards it can part with its tail when attacked, but cannot, as some suppose, shatter itself against rocks and then put itself together again when the danger is past. Glass snakes are found in central and southern United States and in Europe and Asia. An African species attains a length of four feet.

Blindworm. The blindworm is a nearly related species of the same family and differs mainly in being smaller, less stiff in its movements and in having grooved teeth, which indicate that the animal was once poisonous. It, too, seems to have been misnamed, as it has keen eyes, which are protected by a thin membraneous covering. Both the blindworm and the glass snake have underneath the skin the rudiments of limbs which have long been useless organs. See Lizard.

Glauber's, *Glou' bers,* **Salt,** a bitter, salty, crystalline compound, which takes its name from a German chemist who first prepared it as a medicine in 1658. Chemically, it is a sodium sulphate, white in color and having crystals that are reduced to powder when exposed to the air. It occurs as the constituent of the medicinal waters of Karlsbad and Seidlitz, Germany, and elsewhere throughout Europe, and in Great Salt Lake, Utah. Aside from its uses as a medicine, it is valuable in the manufacture of certain kinds of glass, and as a mordant in dyeing and printing. See Dyeing.

Glau'cus, in classic myths a fisherman who became a sea god on tasting some magic herb. He loved the maiden Scylla, who spurned him. In his grief he applied to the sorceress, Circe, begging not to be cured of his passion, but to have it returned. Now Circe, for her part, loved Glaucus, and so enraged did she become on not being able to win his affection, that she vented her spite on her rival. By poisoning the water in which Scylla was wont to bathe, Circe transformed her into a destructive monster. See Charybdis.

Another Glaucus was the Trojan hero, grandson of Bellerophon, who, with Sarpedon, led the Lycian forces of Priam.

Glendower, *Glen' door,* **Owen** (about 1359-about 1416), a Welsh chieftain, descendant from the last regular Prince of Wales and noted for his rebellion against Henry IV. Before Henry became king, Glendower was a follower of Richard II, but upon Henry's accession he changed his allegiance. Later, because of depredations upon his estate, which Henry took no measures to prevent, Glendower declared himself Prince of Wales, gathered about him a band of followers, intrenched himself in the mountains and resisted the King's force for a number of years.

Glens Falls, N. Y., a city of Warren Co., 40 m. n. of Troy and 60 m. n. of Albany, on the Hudson River and on the Delaware & Hudson Railroad. The region abounds in points of interest connected with the French and Indian and Revolutionary wars. It derives its name from the falls in the Hudson, which supply excellent power for manufacturing. The city contains the Crandall Free Library, a state armory, St. Mary's and Glens Falls academies, an old ladies' home and the Parks Hospital. There are large quarries of limestone, extensive limestone works, Portland cement works, saw and planing mills and manufactories of paper, shirt waists, collars, etc. Population, 1920, U. S. Census, 16,638.

Globe, a sphere. Artificial globes constitute an important part of schoolroom apparatus. They may be made of metal, plaster or cardboard. There are two kinds of globes, the terrestrial and the celestial, the former containing a representation of the earth's surface, the latter a diagram showing the positions of the heavenly bodies. The terrestrial globe is held in position on a frame by a rod through the center corresponding to the earth's axis; and by means of it the globe is free to rotate, and its inclination to the plane of its axis is the same as that of the earth's body. On the globe, parallels of latitude and the meridians are indicated, and sometimes elevations of land, such as mountain ranges. The finest celestial globes, if set in proper position, so exactly represent the positions of the stars that a straight line beginning at the center of the globe and passing through the point on its surface indicating a particular star, if projected into space, would pass through the star so indicated.

Globe, Ariz., county seat of Gila Co., 124 m. s.w. of Bowie and 82 m. n. of Tucson, on Pinal Creek and on the Gila Valley, Globe & Northern Railroad. The city is noted for its great output of gold, silver and copper ore, and since the first settlement in 1873 has developed from a mining camp into a modern city. The adjacent region is rich in mineral wealth, and the city is surrounded by the Mogollon, White, Mazatzal and other mountains. The climate is exceedingly mild. Globe contains good municipal buildings and an excellent system of public schools. A city charter was granted in 1907. Population in 1920, according to the U. S. census, 7,044.

Globigerina, *Glo bij"er i' na,* a family of microscopic animals of the group known as Foraminifera. The various species are chiefly found in the deep sea, where they form a part of the floating plankton and where after death they sink and their tiny shells form the soft mud known as globigerina ooze. At great depths in the ocean floor this forms a stratum known as gray chalk. The shell of the globigerina consists of a thin, limy covering separated into a few spirally-arranged chambers; upon the outside are several depressions and spines which aid it in keeping afloat; some of these chambers contain a light liquid of less specific gravity than water, and these, too, aid in keeping it at the surface. The globigerina has no skeleton and no specialized canal systems. Its most conspicuous feature is the mouth opening, a characteristic which it has in common with all Foraminifera. The globigerina is the most abundant of this group. See PROTOZOA; PLANKTON.

Gloucester, *Glos' ter,* **Mass.,** a city and port of entry of Essex Co., 28 m. n.e. of Boston, on Massachusetts Bay. It is beautifully situated on the south side of the Peninsula of Cape Ann, and is connected by the Boston & Maine Railroad with the principal seaports and towns of the seaboard and interior. The city is a popular summer resort and the picturesqueness of its surroundings attracts many artists and tourists. There is a large, accessible and safe harbor for vessels of the largest class, and coal, salt and lumber are extensively imported. Gloucester is one of the most important fishing ports and fish markets in the world, having over 500 vessels engaged in the fisheries. Cod, herring, halibut and mackerel are the chief catches. It has also extensive granite works, foundries, forges, shipyards and manufactories of oil clothing, twine, sails, shoes, fish glue and anchors. Not far distant is the massive sunken rock called Norman's Woe, rendered famous by Longfellow's *Wreck of the Hesperus.* Numerous vessels have been wrecked in the vicinity.

Gloucester was occupied as a fishing station as early as 1624, being the first settlement made on the north shore of Massachusetts Bay. The first settlers were from Gloucester, England, from which it received its name. It has the oldest Universalist church in the United States, founded in 1770. Annisquam, Bay View, East Gloucester, Lanesville, Magnolia, West Gloucester and Fresh-

water Cove are near-by villages and summer resorts. Gloucester was chartered as a city in 1874. The city has the commission form of government. Population in 1920, 22,947.

Gloucester, N. J., a city of Camden Co., about 1 m. s. of Camden, opposite Philadelphia, on the Delaware River and on the Atlantic City and the West Jersey & Seashore railroads. It has ferry connection with Philadelphia. The city has manufactories of Smyrna rugs, woolen yarns, incandescent gas burners, boats, drills, fertilizers, etc. Gloucester was settled in 1677 and incorporated in 1868. Population in 1920, 12,162.

Glove, *Gluv,* a covering for the hand that encloses each finger in a separate sheath. A mitten has a separate sheath for the hand alone. The glove is of very ancient origin, and we do not know when or where it first come into use, but there are authentic accounts of gloves being worn by the ancient Persians. The ancient Greeks and Romans considered gloves unnecessary as a means of protection, but in the latter part of the Roman Empire they were worn by the nobility and were highly ornamented. During the Middle Ages the glove was a mark of distinction, and those worn by officials of high rank were elaborately ornamented. They were taken off in the presence of superiors. The gauntlet, or glove of mail, was a part of the knight's armor, and throwing it down before an adversary was a challenge to combat. If the adversary picked up the gauntlet he accepted the challenge.

There are two principal classes of gloves, those made of cloth, yarn or thread and those made of the skins of animals, either with or without the fur. Leather gloves of the finest quality or genuine kid gloves are made from the skins of young goats, but most of the so-called kid gloves on the market are made from sheepskin. Buckskin gloves are generally made of sheepskin, calfskin, cowhide and horsehide, tanned, dressed, finished and split for the purpose.

MANUFACTURE. Gloves are stamped out of the finished leather into forms by special dies; the parts are sewed together by a special type of sewing machine; and afterwards the gloves are shaped and stretched over a metal hand heated by steam from within. While on this hand they are smoothed, polished and finished. Finally they are marked, assorted into sizes, arranged in pairs and wrapped in boxes ready for shipment. Kid gloves bearing the names of Paris factories have generally enjoyed the reputation of being the finest, particularly those made for women for full dress, and those of so-called dogskin for men's wear from London have been similarly favored. However, by introducing improved methods of tanning and preparing the leather, and, furthermore by importing skilled labor, the United States, which now makes an immense number of kid gloves, has made rapid progress in glove manufacture.

Knitted white gloves of cotton are used largely by policemen, porters and carriage drivers. Mittens of cotton cloth are made in great quantities, and are principally used by farmers, mechanics and laborers to protect their hands against injury when handling materials. Gloves made of rubber combined with cloth are used by housewives when dusting, sweeping and in washing dishes. A very thin glove made of rubber is employed by physicians and surgeons to prevent infection. Knitted wool gloves and those of fur are the best gloves for protection against cold.

Gloversville, N. Y., a city of Fulton Co., 53 m. n.w. of Albany, on the Fonda, Johnstown & Gloversville Railroad. The Nathan Littauer Hospital is located here. The city contains many fine public buildings. It is the principal seat of the glove manufacture in the United States, its factories, with those of Johnstown, a sister city, controlling a large proportion of the entire production of the country. It has also extensive manufactories of glove and shoe leather. Population in 1920, U. S. Census, 22,075.

Glow'worm", a name variously applied to a number of wingless insects

having the power to emit light. This ability is seated in certain organs called luminous patches, which are located generally just beneath the skin on different parts of the body; they are composed of a network of nerves and of fatty tissue connected with the trachea in such a manner that air may be passed through them. The union of the oxygen and the tissues produces a slow combustion with the evolution of light. In America the wingless female of the firefly and its larvæ are called glowworms. See FIREFLY.

Gloxin'ia, a native of the tropics belonging to the Gesneria Family. It is an almost stemless plant with wavy-margined leaves and irregular, bell-shaped flowers of various colors. The gloxinia is a favorite greenhouse plant and under cultivation produces numerous showy flowers. It is also used as a garden and house plant.

Glucinum, *Gloo si' num,* or **Beryl'lium,** an element found in the mineral, beryl, which under some conditions is known as emerald, a gem. On account of the sweetish taste of its salts, it was first called glucinum, and the two names are both in use at the present time. Glucinum was first obtained free by Bussey, in 1828. It is a comparatively rare element, though it is found in other minerals, notably the emerald.

Gluck, *Glook,* **Christoph Willibald** (1714-1787), a musical composer, of German parentage, but identified with the French school, born near Nuremburg. After study in Milan he wrote many florid operas in the contemporary Italian style. In 1745 he went to London, where the scathing criticism of Handel awakened in Gluck a realization of his deficiencies, and going to Paris he developed a music drama that was to be epoch-making. His later themes were lofty, many of them taken from classic drama, and in his handling of them all former flowery effects were sacrificed for the sake of dramatic consistency. The greatest of his operas are *Orpheus and Eurydice, Iphigenia in Aulis, Iphigenia in Tauris, Armide* and *Alcestis.*

Glucose, *Gloo' kose,* commercially the name of sirup made from starch. The glucose placed on the market in the United States is made from corn. The process consists first in making starch from the corn (See STARCH), and then producing glucose from the starch. The starch is converted into sugar by forming it into a paste with water containing sulphuric acid, and boiling the mixture. The acid is removed by adding chalk, and the mass is again heated and filtered through a press under steam at a pressure of 25 to 40 lb. per square inch. This gives a clear sirup, which when cooled forms solid glucose. This product is refined by reducing it to liquid form and filtering through charcoal, two products being obtained, the glucose of commerce and a residue known as grape sugar, because of its resemblance to sugar obtained from grapes. Glucose is used extensively in brewing malt liquors, as a substitute for sugar, and in the manufacture of candy and artificial honey. It is not as sweet as cane sugar, but when properly prepared, it forms a cheap and healthful food. It is made chiefly in Germany and the United States. See CORN.

Glucose Sirup, or **Corn Sirup,** a sirup made from the starch of corn, used extensively in canning fruit and in making confectionery. Its manufacture has become a great industry in the United States, where the standard sirup does not contain more than 25 per cent of water nor more than three per cent of ash. The entire process of manufacture requires more than three days. The corn is steeped in water containing sulphurous acid, after which it is ground and the starch allowed to separate. The starch is then cleaned and heated with hydrochloric acid and water in closed vessels called converters. At the close of this step, or when the starch has all been converted to sugar, the remaining acid is neutralized and a long process of filtration and concentration follows. The filtration is both bag filtration and bone-black filtration. With the final concentration the liquid becomes a thick, sirupy

mass which does not crystallize readily and which is sweet to the taste, although only about one-half as sweet as cane sugar.

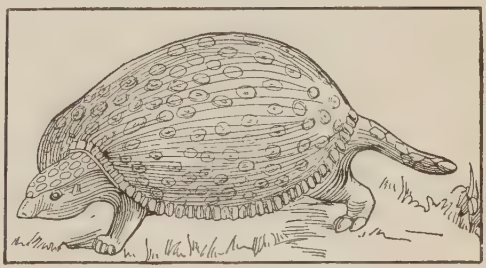
Glucose sirup is used in adulterating other sirups, as a substitute for malt in brewing and, most widely, in making confectionery and in canning and preserving fruit. Consult *Bulletin 66,* Bureau of Chemistry, United States Department of Agriculture, for a complete discussion of its manufacture and use.

Glue, a fluid cement, or adhesive preparation. It is usually impure gelatin (See GELATIN). Glue is employed to unite pieces of wood and other materials. It is purchased at stores in thin, hard, brittle cakes of dark brown color, which, on boiling with water in a kettle surrounded with water to prevent scorching, forms a sticky mass known as liquid glue. Isinglass dissolved in cold water makes a glue known as fish glue. This is used in making a gum for sealing envelopes. Isinglass glue is made by soaking isinglass in cold water until it swells, and then adding spirits of wine and chalk. Marine glue is equal parts rubber and shellac, dissolved separately in naphtha and then mixed.

Glutton. See WOLVERINE.

Glycerin, *Glis' er in,* an oily, colorless liquid obtained in large quantities in soap factories by treating fats with steam at a high temperature, or with lime. Pure glycerin is solid, but the presence of the slightest impurities prevents it from crystallizing; hence it usually occurs in liquid form. It is about as thick as sirup and has a slightly sweetish taste. It dissolves readily in alcohol, but is insoluble in ether. It mixes with alcohol or water in any proportion. Glycerin is used in preserving animal and vegetable substances; as a vehicle for administering medicines; for many purposes in the arts, such as keeping a material moist; in the manufacture of tobacco; in keeping paper moist for printing; in spinning, weaving, tanning; and in rope making. It absorbs moisture from the air and lowers the freezing point of water. It is employed in the manufacture of nitroglycerin. As an ingredient of toilet soaps, it is valuable in softening the skin. In medicine it is used to soothe and heal. Confectioners employ it, and it is used to adulterate beer, wine and milk. It is sometimes itself adulterated with glucose.

Glyp'todon, an extinct animal 10 or 12 ft. in length, allied to the armadillo and somewhat resembling the turtle. It had short, stout legs and stubby, hooflike toes, and stood in a more upright position than the turtle. A bony armor covered the back and extended down over



GLYPTODON

the sides of the body. The tail and head were similarly protected. Fossil remains of the animal have been found in Florida, Texas, Mexico and South America.

Gnat, *Nat,* a name given to a number of small, annoying insects of the order Diptera. Members of the family are always disliked because of their bloodthirsty habits and their long, sharp proboscis which forms their organ of torture. The eggs are laid upon the water and float there for three days, after which they hatch into aquatic larvæ. Fifteen days are necessary for the larvæ to pass through the stages of development to the adult form. To rid a community of gnats is comparatively easy if the pools of standing water are removed. The name gnat is becoming less common in usage and is being replaced by that of mosquito, which formerly referred to but one genus of gnats. See MOSQUITO.

Gneiss, *Nise,* a family of metamorphic rocks composed chiefly of mica, feldspar and quartz and numerous accessory minerals, among them garnet, graphite and

tourmaline, and sometimes copper, iron, cobalt, gold, silver and other metallic ores. It has nearly the same mineral composition as granite, but differs from granite in structure, the constituents lying in layers instead of massive, as in granite. It is the most widely distributed of all metamorphic rocks. The origin of gneisses is not certainly known. They are of great geological age and were the typical rocks of the Archæan series. They are often found accompanied by limestone, graphite, schists, quartzites and other sedimentary rocks, and for this reason many of them are thought to be sedimentary in origin, having been transformed into their present state by crushing, heat, recrystallization and other metamorphic agents. Also, their chemical composition differs from that of other igneous rocks. Many gneisses are igneous and, in structure, modifications of the normal type. They are sometimes an intermixture of sedimentary and igneous rocks. The commonest and most important class of gneisses are those containing mica. Porphyritic gneisses contain large crystals of feldspar, which sometimes traverse several layers.

Gnomes, *Nomes,* in Norse mythology, part of an army of maggotlike creatures bred in the body of Ymir, giant of fire and ice, to whom the gods gave forms and divine intelligence. These gnomes, dark, crafty beings, were condemned to underground Svart-alfa-heim (home of the black dwarfs), and appeared in daylight only under penalty of being turned to stone. Under the leadership of Sindri they mined gold, silver and rich stones, besides acting as smiths for the gods. The female gnomes occasionally crept out to torment man. In this case he had nightmare. Dwarfs, trolls and kobolds were other names for gnomes. See FAIRY.

Gnu, *Noo,* or **Wildebeest,** *Wild'beest",* a peculiar African animal of the Bovine Family and related to the antelopes. It has a strong, but slender body and a heavy, buffalolike head with strong, curving horns. There are two chief varieties: one with brown fur, a long, reddish-white mane and tail and long, dark hair on the chest; the other with blue-black coat and black mane and tail. Both species require a great deal of water and are thus unable to live in the desert. The wild gnu has been almost completely exterminated.

Goat, a useful member of the Bovine Family, which in many countries takes the place of the sheep, the cow and the mule. It is extremely hardy and can be used as a beast of burden in mountainous countries because of its sure-footedness and its ability to feed upon the coarse vegetation which would not support more delicate animals. The goat is also valuable for its milk, which is sweet and nourishing, and for its coarse, strong hair, which is useful in making a cloth called mohair. The Angora goat is a highly prized variety of the domestic goat, whose long, silky fur produces the best mohair; the cloth made from its fur remains firm and does not mat.

Asia, especially the southern portion, is famous for its cashmere goats, which are another silky-haired variety. From their fur are made the valuable cashmeres of India (See CASHMERE GOAT). In America large herds of goats are less common. Their principal use is as pets or for clearing ground of coarse brush. In their feeding they are omnivorous and voracious. Goats have hollow, curving horns, slender, agile limbs and short tails. The face is somewhat sheeplike, although the snout is more pointed and the eye more eager than that of the sheep. The male goat is bearded and is apt to be of rather uncertain temper.

At present there are in the United States, according to the census of 1910, 2,798,160 goats having a total value of $5,964,812, and yet in the past ten years Americans have sent to foreign countries $250,000,000 for goatskins. Considering that the goat is of value not only for its skin but also for its flesh, milk and tallow, it would seem that larger herds might be raised with great profit in the United States. See ROCKY MOUNTAIN GOAT.

Goatsucker, a bird of the Whippoorwill Family. It is about ten inches in length, and is ash-gray, spotted and barred with brown, black and chestnut. White spots are conspicuous on the wings and the outer feathers of the tail. The mouth is very large, the gape extending back to the eye. The two eggs are laid on the bare ground. The goatsuckers, which are confined to the Old World, were so named because of an ancient superstition that they sucked the milk from goats and cattle. The name "night jar" is often used for these birds and is given on account of the purring or jarring noise which they make.

Gobi, *Go' be,* **Desert of,** a desert region of central Asia, forming an extensive plateau about 3000 ft. above sea level, a dreary stretch of sand, tablelands and mountains. The climate is generally severe, but during the summer the rainfall suffices for an adequate pasturage for flocks and herds. Nomadic tribes, chiefly Buddhists, inhabit the central part, and to the north are several permanent settlements; numerous caravan routes connect Siberia and China proper.

God, the creator and ruler of the universe. In all languages there is some word or expression that voices, directly or suggestively, this idea of a supreme or superior being or beings who inspire reverence or worship. The idea is often vague and elusive among primitive peoples, manifesting itself in superstitious fear of the powers of nature and of ghosts. As such spirits peopling the universe are many, polytheism, the belief in many gods, is the result. But with advancing civilization and increasing intelligence and knowledge, the tendency is to a belief in one true and supreme God. The God believed in and worshiped by Christian nations is the God revealed or discovered in the history of the Hebrew people, supplemented by the life and teachings of Jesus. This God is a spiritual being, self-existent, all-powerful, all-wise, everywhere present, a wholly just and loving personal spirit.

Various arguments have been used in the course of history to prove the existence of God. The following are the most noted of these: The *ontological* argument holds that the subjective existence of the idea of God involves the objective existence of God himself. The *cosmological,* or causation, argument proceeds from the existence of secondary causes back to the final cause of the universe. The *teleological* argument, or argument from design, holds that the evidences of plan, harmony, purpose and adaptation in the world prove the existence of an intelligent designer. The *moral* argument maintains that the moral law within us involves a moral lawgiver in the world outside of us. The validity of these arguments has been called in question, and it is true that no one today would attempt to present them in the strictly logical form of the past, although the conceptions that underly them still have weight. But the reasons for the belief in the existence of God have now taken a wider range, including the study of human history, of human nature and the existence of the whole intelligent and moral world, and make the postulate of the existence of God vastly more probable than any other view. See RELIGION; JESUS CHRIST; MOHAMMEDANISM; CHRISTIANITY.

Godavari, *Go dah' va re,* **River.** See INDIA, subhead *Physical Characteristics.*

Godfrey of Bouillon, *Boo"yon',* (about 1060-1100), a leader in the First Crusade, born in Belgium. When the forces of Henry IV, Emperor of Germany, besieged Rome, Godfrey was the first to scale the walls. For this act Henry made him Marquis of Antwerp and Duke of Lorraine. He raised an army of 80,000 infantry and 10,000 horsemen, led them with great ability through Germany to Constantinople, captured Antioch and arrived at Jerusalem in 1099. After a siege of five weeks a breach was made in the walls and Godfrey was among the first to enter. He ruled in Jerusalem for a year and elaborated the system of medieval jurisprudence called *Assize of Jerusalem.* He died in 1100 and was buried in the Holy Sepulchre.

God Save the King (or **Queen**), the national anthem of Great Britain. The origin of the words and music is a matter of dispute. The familiar song *My Country 'Tis of Thee* is sung to the same tune, and Germans and Russians also have national songs written to this music.

God's Truce. See TRUCE OF GOD.

Godwin, Parke (1816-1904), an American journalist, born in Paterson, N. J. He was associated with his father-in-law, William Cullen Bryant, in editing the New York *Evening Post,* and he edited *Putnam's Magazine* for a short while. As an author he is known for his *Handbook of Universal Biography, A Mythological Tale, Political Essays* and for his edition of *The Life and Works of William Cullen Bryant.*

Goethals, *Go' thals',* **George Washington** (1858-), the builder of the Panama Canal, was born in New York City and educated at West Point, graduating in 1880. He was for four years instructor in civil and military engineering at West Point. He superintended the construction of the Mussel Shoals Canal along the Tennessee and during the Spanish American War was engineer for the volunteer army. In 1907 Colonel Goethals became Chief Engineer of the Panama Canal where his skill as an engineer and administrative ability won him a world-wide reputation. In 1915 he was made Brigadier General and appointed Governor of the Canal Zone.

Goethe, *fon Gu' te,* **Johann Wolfgang von** (1749-1832), a German poet, dramatist and philosopher, born at Frankfort-on-the-Main. His father's seriousness and his mother's impulsive imagination as well as poetic gifts were a precious inheritance to the young boy, who fed his childish fancies on books, antiquities and works of art in the old home. He was a precocious child, knowing something at eight of French, Italian, Latin and Greek. In 1765 he went to Leipsic to study law, and, after a brief illness which compelled him to return to Frankfort, he continued his legal studies at Strassburg. There he also took up music, anatomy, art and chemistry. He met Herder and a close intimacy was formed between the two; they spent their time studying the masterpieces, Herder urging the need to create national ideas and to appreciate Shakespeare and the folk songs. About the same time Goethe fell in love with a charming girl, an experience which colors some of his later literary work.

He returned to Frankfort after graduating in 1771, went to Wetzlar to practice law, and soon published his first drama, *Götz von Berlichingen.* Then there came a new love affair, which the novel, *The Sorrows of Werther,* immortalizes. In 1775 he was invited by Karl August to become one of the court at Weimar, and gradually the heavy State duties forced the young poet to give up his round of merry pleasures. As a man of affairs his foresight, energy and balanced judgments brought him wide political recognition. Agriculture, horticulture, geology and mineralogy, as interests of the State, soon became his own, and he devoted only a small part of his time to writing during the ten years that followed. In 1786 he asked leave to visit Italy, and could scarcely restrain his impatience at the thought of the long-expected journey which was to exert so tremendous an influence on him.

In Italy, the land of blue skies, he gained a clearer vision of his duty and mission as a poet, and from the year 1788 he worked with the calm and self-possession of a seer. Never wholly in sympathy with the "Storm and Stress" movement of the literature of his native country, he here caught the spirit and the beauty of the Greek classics, and a change becomes apparent in all his subsequent work. The unfinished products, *Iphigenie, Egmont, Tasso* and *Faust* which he brought with him to Italy, were later completed in a wholly different vein from the one in which they were begun. On his return to Germany he found his country backward in its literary activity as well as appreciation, and for some time he renounced writing, devoting himself to scientific pursuits.

His renewed interest in literature was brought about through the influence of Schiller, who soon proved to be an encouraging and sympathetic critic. Goethe now wrote *Reinecke Fuchs, Wilhelm Meister,* the fragment of *Achilleïs,* his share of the *Xenien* and *Hermann and Dorothea.* The last is a classic of simplicity, done with Homeric insight, without sentimentality and without idealization. He made use of an old and homely story, and made it a masterful tribute to family life. An unsuccessful attempt was also made to complete the first part of *Faust.* He published an exquisite cycle of ballads, *Der Zauberlehrling, The Bride of Corinth, Alexis and Dora* and *The Good Women.*

Despite the fact that he was not in sympathy with the Romanticists they looked upon him as their master, and when the first part of *Faust* appeared in 1808 they hailed it enthusiastically as the very triumph of their art. After the death of Schiller, whose loss Goethe deeply mourned, a third period of activity followed, during which he wrote *Elective Affinities,* his autobiography published under the title, *Truth and Fiction Relating to My Life,* the *Conversations,* the continuation of *Wilhelm Meister* and the second part of *Faust.* During the last years of his life he lived in retirement, except for the pilgrimages made to his home by the younger generation, who looked upon him as a literary giant, a survivor of an heroic past.

Of his work in the many fields, posterity has shown a willingness to ignore his scientific researches and economic theories, despite the fact that they were modern to an extraordinary degree; even his art criticism and his novels have minor significance. But as a lyric poet he stands supreme in a country essentially lyric in its literary expression. There is an exquisite grace and a sweetness about his verse, and a combination of melody and music of words, as well as sentiment and depth of feeling, such as few poets of the world have paralleled. And *Faust,* his masterpiece on which he labored from early manhood until the approach of old age, is Germany's most national drama. It is the full "confession" of his life and experience. But it is more than the story of individualized experience; it embraces the strivings of the Humanists of the 18th century, and in the Second Part the poet enters the unreal world of allegory and presents the whole of human life and activity. His theme is the turning of an idealist from private haunts, thoughts and dreams, from all that is unnatural, to the real world, to the company of men and to nature and the founts of life. There is here a noble expression of the poet's faith in the ultimate triumph over the powers of evil, and his world-wisdom and philosophy of life are sounder and wiser than any other that literature has recorded since the Renaissance. That Goethe himself considered it the culmination of his life work is apparent by his exclamation when he was sealing the manuscript of the Second Part: "The rest of my life may be regarded as a free gift. It is now really indifferent what I do, or if I do anything at all."

Goethe's genius was of the universal type, a mind responsive to all the intellectual interests that literature, art, science and philosophy might offer. He was first and last modern, quick to sympathize with the changing social conditions of the 19th century, and as ready to grant that the idyllic age of his early years, the last decades of the 18th century so fruitful in their contributions to art, must yield to the demands of a new industrial system. As a philosopher and as a moralist he exerted a powerful influence. Greater only than his work was the fullness and richness of his life itself.

Goi'ter, a disease causing swelling of the thyroid gland in front of the throat. It is universal, but in certain localities the cases are more numerous than in others. It is a common occurrence in Switzerland and is not infrequently found in the Alps, Andes and Himalaya Mountains, in Derbyshire, England, and in various other localities where the geological formation consists largely of lime

and the drinking water is impregnated with that mineral. Women are oftener affected than men.

Gold, a precious metal, which, on account of its luster and resistance to oxidation, has always been used in ornamentation and as money. Gold is found in quartz veins in the oldest rocks and in the sand of most river beds. It is estimated that there is two cents' worth of gold in every ton of sea water. Gold is found in association with lead, silver and copper, and many processes for separating it from its alloys are now in use. See METALLURGY.

Gold is a relatively soft, reddish-yellow metal of such ductility that it can be drawn into exceedingly fine wire threads and beaten into very thin leaves. The light passing through these leaves has a greenish tinge, and gold when melted is a greenish liquid. Gold does not tarnish in air even when heated, and is attacked by only one single acid, selenic, or by the compound nitric-muriatic acid, called aqua regia. It is also soluble in potassium cyanide.

Gold is so soft and wears away so rapidly that it is seldom, if ever, used pure, but generally in alloy with copper or silver. With the former it has a tinge of red, and with the latter a paler gold color. American gold coins are 90 per cent gold and 10 per cent copper. Goldsmiths estimate the purity of gold in carats, 24 carats being pure gold. Most jewelry is from 14 to 18 carats fine. Gold is used everywhere for the choicest ornaments and ranks in this respect with the precious stones. It is also the standard for money in all civilized countries.

The chief gold-producing countries are South Africa, United States, Australia, Mexico, Canada and Russia. The annual production of gold in the world is about $450,000,000. Of this amount the United States produces about $96,000,000, Africa about $175,000,000 and Australia about $65,000,000. The leading gold-producing states of the United States are California, Colorado, Nevada and South Dakota.

Gold and Silver Certificate. See MONEY, subhead *Paper Money.*

Gold Beating, the process by which gold is hammered into extremely thin leaves, making what is known as gold leaf. This is used in ornamental gilding to protect metal surfaces against rust, and for filling teeth. The arts of gold beating and gilding were known to the Egyptians many centuries before the Christian Era. The process in gold beating is first to cast the gold into thin, oblong pieces weighing two ounces. These are flattened into a ribbon of about 1/800 of an inch thick, and the ribbon is then cut into pieces one inch square; 150 of these are placed between intervening leaves of vellum, or tough paper, and enclosed in a parchment case. This pack is beaten on a wooden block with a heavy hammer until the gold pieces measure four inches square. These are then cut into four pieces, when they are again beaten in a similar manner, but this time between leaves of goldbeater's skin, a membrane from the intestines of cattle. The final result is a thickness of about 1/200,000 of an inch, making an ounce of gold cover about 100 sq. ft. By using silver and other different metals as alloys a variety of colors is obtained, but if the gold is too much adulterated, its malleability is destroyed. See ALLOY; GILDING.

Gold Coast, a British crown colony of West Africa, lying between the Ivory Coast and Togoland and reaching from the Gulf of Guinea to French West Africa. In its southern part lies the Province of Ashanti (See ASHANTI); its total area is 82,000 sq. m. Near the coast the country is level, but farther inland are low mountain ranges. The soil is fertile, but because the climate is not healthful settlers are not attracted to the country. Palm oil, palm kernels, valuable woods and gold dust are exported. The population is about 1,502,900, most of whom are pagans.

Golden-Crowned Thrush. See OVENBIRD.

Golden Eagle. See EAGLE, subhead *Golden Eagle.*

Golden Fleece, in classic myths the ram's fleece for which Jason and his hero crew sailed to Colchis in the Argo. See ARGONAUTS; JASON.

Golden Gate. See CALIFORNIA, subhead *Scenery.*

Golden Robin. See ORIOLE, subhead *Baltimore Oriole.*

Goldenrod, an American wild flower of the Composite Family, so common that it has been chosen the national flower of the United States and the state flower of Missouri, North Carolina, Alabama, Kentucky and Nebraska. There are over 100 species known in the United States, and all are roadside or river-bank plants, blooming in the late summer and early autumn. The stems are brown and dry, varying in height and being smooth or hairy according to the species. The leaves also vary greatly in the different species, being rough or smooth, parallel-veined or much-divided. In all but one species, the white goldenrod, or silver-rod, the flowers are yellow.

The most common species, the early goldenrod, the showy goldenrod and the late goldenrod, bear their flowers in long, loose clusters, often mostly on one side of the stem and often in partly pyramid form. The other common species are rather easily distinguished, from their names: broad-leafed goldenrod, acute-leafed goldenrod, seaside goldenrod and sweet goldenrod. The last species has a noticeable fragrance when crushed.

Goldfinch, a bird of the Finch Family. The American goldfinch, also known as the yellowbird and the wild canary, is a beautiful little bird about the size of a canary, which it closely resembles. In summer the male is bright yellow, with black crown, wings and tail and white wing and tail markings. The female is olive-brown above and yellowish below and has no black on the forehead. In the winter the male is of the same color as the female. The song resembles that of the canary. The nest is placed in the crotch of a tree or bush not far from the ground, and is a cup-shaped structure, skillfully woven and lined with thistle down, thus giving the bird locally the name thistle bird. It contains three to five bluish eggs. In autumn these birds collect in flocks. They feed upon seeds, being especially fond of the goldenrod, thistle and sunflower. They do not migrate and can be kept near dwellings during the winter by planting sunflowers in the garden and leaving them for the birds to feed upon.

Chapman says: "I wish everyone knew the goldfinch. His gentle ways and sweet disposition are never failing antidotes for discontent."

Goldfish, a Chinese fish of the Carp Family, introduced into the United States and other countries because of its beautiful form and color. A darker color is natural to the goldfish, and the pure yellow fish are obtained only through careful selection and breeding. The goldfish are small, rarely more than six inches in length, and are among the very few fish which are tamable and show any signs of affection. They have become domesticated on the Potomac through escape from fountains and aquariums, but have there reverted to their natural dark color.

Goldschmidt, Jenny Lind. See LIND, JENNY.

Goldsmith, Oliver (1728-1774), an English poet, novelist and playwright, born probably in Pallas, Ireland. He studied at Dublin University, graduating in 1749, and attempted to enter five or six professions without success. When he applied for ordination he was quickly dismissed from the episcopal palace for appearing in a bright scarlet costume; the money his uncle gave him to study law in London was lost in a gambling den; his stay at the University of Edinburgh and at Leyden left him with only a smattering knowledge of medicine. From 1753 to 1756 he wandered through Europe, making his way (as runs the story) with a flute, on which he played so merrily that the dancing peasants hospitably offered him a bite to eat and a bed. Then he turned to hack-writing, and in the magazines for which he wrote appeared his *Enquiry into the Present State of Polite Learning in Europe,* the

Chinese Letters (later known as *The Citizen of the World*) and the *Life of Richard Nash.* In 1764, his whimsical and delightful writings having attracted attention, he became one of the original members of the famous Literary Club in London. Dr. Johnson, as the account goes, was the agent for the sale of the manuscript of the *Vicar of Wakefield,* which was sold in 1764, appearing two years later. Despite the successes of his novel, poems and comedies alike, he always remained poor, himself and his own mismanagement to blame for his sharp distresses.

The two productions which made him famous as a poet are *The Traveller* and *The Deserted Village.* In both are found a spirit of quiet meditation, a moralizing strain and a winsome view of rustic life. His classical couplet is a close approach to the polish and perfection of Pope's. His comedies are pure and laughing, in drollery and rich mirth far surpassing anything previously written during this period. *The Good Natured Man* was not warmly received, for the public was too accustomed to the sentimental comedy of the age to recognize its merits. But the sprightly, uproarious humor of *She Stoops to Conquer* triumphed and its first night was a splendid success. No less fascinating in its humor and gentle satire on village life was the *Vicar of Wakefield,* a novel with an aimless plot but with sparkling fun and inimitable character portrayal. Goldsmith adhered with difficulty to fact, and his *History of England,* as well as his essays, though at their worst very readable, are lacking even in any pretense of accuracy.

Gold Standard. See BIMETALLISM.

Golf, a game known to have existed in very ancient times among the people of Holland and Belgium, where, however, it was most commonly played on the ice. It derived its name from the Dutch word for club. Introduced into Scotland previous to 1457, it had by that time begun to rival archery in the affections of the people; and has now long been known there as "The Royal and Ancient Game of Goff." Since 1880, however, the tremendous interest among the English people has greatly stimulated interest among the Scotch; while, in the United States, the game has become immensely popular since about 1890.

Golf is played on fields, or *links,* over courses of either 9 or 18 *holes,* these being four and one-half inches in diameter and not less than four inches deep, and located at the center of carefully tended spots called *greens.* A course of 18 holes should be not less than three nor more than five miles long. The holes should be from 100 to 600, or more, yards apart; and the last should be near the first. The location of each is indicated by a metal flag supported on an upright iron rod which rests in the hole except when temporarily removed by a player. If one plays alone, he aims to drive a white gutta-percha ball, one and three-quarter inches in diameter and weighing from 26 to 28 pennyweights, over the entire *course,* putting it successively into each of the holes, with the fewest strokes possible. He is said to play against *bogey,* a specified number of strokes allowed for each hole, and for the course.

It is desirable to have numerous obstacles, or *hazards,* between holes. Where such do not exist, in the form of walls, trees, pits or water courses, they are supplied by artificial means. For overcoming these various difficulties, clubs of different size and form have been devised. Six are usually deemed sufficient,—one for long drives, and others to raise the ball over obstacles, remove it from difficult positions or for the short strokes necessary upon approaching a hole. In starting, and after the ball is removed from a hole, it is placed on a little elevation, called a *tee,* which is commonly of sand. This makes possible a long *drive* at a single stroke, perhaps 200, 250 or 280 yards. When two or more compete, they play in regular order; and, after each hole, in the order in which they made that, or *holed* out.

The game is called *singles* when between two, and *foursomes* when two, as

partners, compete against two others. In *match play* the winner has finished the course with fewer strokes than his opponent. In *medal play* the game goes to the one who wins the largest number of holes. In America, the central authority, since 1894, has been the United States Golf Association. There are, however, numerous subordinate leagues and associations and numerous independent clubs.

Gomez Y Baez, *Go' mase e Bah' ase,* **Máximo** (1826-1905), a Cuban patriot and general, born at Bani, San Domingo. When a young man he served for a time in the Spanish army, but later became a planter. On the breaking out in 1868 of the series of insurrections, Gomez took his place among the insurgents. He soon became a leader and then a commander of Cuban forces. In 1895 he was made general-in-chief of the Cuban army, but was dismissed in 1899 because he received for his soldiers $3,000,000 appropriated by the Congress of the United States. He cooperated with the United States in the effort to secure Cuban independence, but his motives were not always appreciated by his compatriots, so that he spent some time in exile.

Gomor'rah. See SODOM.

Gom'pers, Samuel (1850-), an American labor leader, born in London, England. He received his education in a night school. He was a shoemaker and later a cigar maker. While serving in this latter capacity he became greatly interested in the conditions of laboring people and in the social questions involved. After coming to the United States he continued his efforts to improve the conditions and lighten the burdens of the laboring classes. Mr. Gompers was one of the founders of the American Federation of Labor, and, with the exception of one year, has been its president. He is also the editor of *The American Federationist,* the official organ of the society. He is also vice-president of the National Civic Federation.

Gon'dola, a boat usually about 30 feet long and four or five feet wide, each end of which is sharp and raised to the height of perhaps five feet. On the canals of Venice, they were for centuries the only means of transportation. They have never been much used elsewhere, and power boats are now threatening their existence even in Venice. In accordance with an ancient law, they have always been painted black, except those of certain officials. The oarsman, or gondolier, stands in the stern facing forward, and rows with a single long oar. Sometimes there is a second oarsman in the bow. Passengers occupy a cabin amidships.

Goo'ber. See PEANUT.

Goode, George Brown (1851-1896), an American scientist, born in New Albany, Ind., and educated at Wesleyan University. From 1887 until his death he was assistant secretary of the Smithsonian Institution, in charge of the National Museum at Washington, D. C. He was a prominent authority on fishes and was connected with various popular scientific exhibitions. His publications, about 400 in number, deal mostly with ichthyology and the management of museums.

Good Friday, a Christian feast honoring the death of Christ on Calvary, and observed on the Friday before Easter. Nearly all Christian Churches have fitting services on this day. In the Catholic Church mass is not said, nor is communion given; but all peoples of the world are prayed for, and at three o'clock the "Way of the Cross" is recited. Candles are unlighted and the stripped altar is overshadowed by a cross veiled in mourning. The vestments worn are black.

Good Templars, Independent Order of, a temperance brotherhood organized on the fraternal order. It originated in Fayetteville, N. Y., in 1851. The members are pledged to abstain from the use of intoxicating liquors and to conform to the rites and ceremonies of the order. The organization includes local lodges, county lodges and an international right worthy grand lodge. There is also a juvenile order. The total membership is about 620,000.

Good Will, in business whatever advantage has occurred to a business because of its location, long continuance, the reputation established by upright dealing and by its connections. In law the good will of a business is considered property and one of the factors in determining the valuation of the business in case of transfer. In such case when a business is sold it is not supposed that the former proprietor will engage in the same business in a locality where his trade will affect the trade of the party to whom he has sold.

Goodwin, Nathaniel Carl (1857-1919), an American actor, born in Boston, Mass. He made his début in 1873, playing in Joseph Bradford's *Law,* and his first decided success was as Captain Crosstree in *Black-Eyed Susan.* In 1898 he married the well-known actress Maxine Elliott, with whom he was associated in several performances. Among the burlesques and light comedies in which he established his wide reputation as a comedian are *Black-Eyed Susan, A Gilded Fool, Nathan Hale, The Altar of Friendship* and *When We Were Twenty-one.*

Goodyear, Charles (1800-1860), an American inventor, born in Connecticut. He early began to manufacture hardware in Philadelphia, soon discovering that the surface of rubber hardened when dipped in nitric acid, thus making it less sticky in warm weather and less brittle in cold weather. This process was used for years in manufacturing rubber shoes. Later, Goodyear perfected the vulcanizing of rubber, which he applied to many practical uses. His patents are in general use today. He was awarded medals at the London (1851) and Paris (1885) expositions, and belonged to the Legion of Honor. See RUBBER.

Goose. See CANADA GOOSE.

Gooseberry, a wild or cultivated shrub of the Saxifrage Family, best known from its juicy, edible fruit. It is a slender, bushy shrub growing generally in close thickets about four feet in height. The leaves are thick, dark green in color, with rounding, wavy-margined lobes, and are often covered with fine, rough hairs. The greenish-yellow flowers are arranged along a slender, curving stem; each single blossom has a tubular five-parted calyx, often colored like the five short petals and enclosing five stamens. The berries are often armed with sharp prickles, which, in cultivated varieties, are less spiny; when ripe the fruits are brown-purple in color, larger than currants and extremely juicy; they are used in making preserves, jelly and medicinal drinks. In the swamp gooseberry the stems are covered with spines, and the berries, which are very spiny, are not pleasant to the taste.

Gopher, *Go' fer,* a name applied to various members of the Bat and the Squirrel families, all of which are burrowing animals. The true gopher is better known as the pocket gopher and belongs to the former family. It is a plump Western animal about the size of a rat, has small eyes and ears, a head which seems clumsily fitted to its body and a sensitive tail that has the appearance of having belonged to a different animal. The mouth is rather small but discloses long, gnawing teeth, and upon each side of it but not opening into it, is a large fur-lined pouch whose object seems to be the prevention of the dirt, dislodged in tunneling, from entering the throat. The claws of this gopher are extremely long and strong and assist in digging its winding passageways. A Southern variety of the pocket gopher is called the salamander.

The striped gopher is of the Squirrel Family and its white-striped, red-brown coat is familiar in the Central and Western states. It is smaller than other gophers, has a long bushy tail and, like the squirrel, an elastic spine which permits it to travel by means of a succession of rapid leaps. It is closely related to the chipmunk and is like it in habits, running along fences, dodging in and out of thickets and chattering continually.

A burrowing land tortoise is known in the Southern States as the gopher.

Gor'dian Knot. In ancient legend, a Phrygian peasant, named Gordius, was raised to the throne by the intervention of the gods. According to the story, the Phrygians consulted the oracle during a sedition, and were told that their troubles would cease should they choose for their ruler the first man they met driving a cart toward the temple of Jupiter. Gordius, as their choice, immediately dedicated to Jupiter his cart and yoke, the knot of which was tied in an exceedingly artful manner. Report soon spread that the oracle had promised the Empire of Asia to him who could unloose the Gordian knot. Many had failed in this attempt, when Alexander the Great passed through Gordium, and, cutting the knot with his sword, declared the oracle fulfilled and himself justified in his claims to universal empire.

Gor'don, Charles George (1833-1885), sometimes called "Chinese Gordon" or "Gordon Pasha," a British soldier, born at Woolwich, England. He attended school at Taunton and later the military academy at Woolwich, after which he joined the royal engineers in 1852. Gordon saw service at Sebastopol and in surveying the boundaries of Turkey and Russia. In 1860, after having served in the Crimean and Chinese wars, he remained in China and took part in the capture of Peking. In 1863, commanding a Chinese force, he succeeded in suppressing the Taiping rebellion, for which he was honored both in China and in England. In 1873 he was employed by the Sultan of Egypt to open the country of the Lower Nile and of certain lakes. During the three years that he spent in this work he became greatly interested in the abolition of the slave trade in the Sudan. His appointment to the governorship of this region in 1877 made it possible for him to do something to relieve the distress that had troubled him. He declined an excellent offer from the King of Belgium to go to the relief of a garrison in the Sudan, was besieged in Khartum and after a gallant defense was betrayed and murdered two days before relief came.

Gordon, Charles William (1860-), a Canadian author and clergyman, generally known by his pen name Ralph Connor, born at Indian Lands, Glengarry, Ontario. He was educated at Knox College, Toronto, and at Toronto University, and spent some time in study at Edinburgh. He became a missionary to the miners and lumbermen of the North West Territories in 1890 and for four years worked among them in the Rocky Mountain mines and camps. Here he obtained the material for his stories, which depict Western life. In 1894 he became the pastor of St. Stephen's Church, Winnipeg. His novels are of high moral tone and contain vivid descriptions of Western scenery, and sympathetic delineations of the class of people among whom he worked. He has a wholesome, pleasing style and displays his love of human nature in a combination of humor and pathos that is appealing and has won for his books a wide audience. Mr. Gordon has held many public offices and has thus rendered great service to his city. His novels include *Black Rock, The Sky Pilot, The Man from Glengarry, Glengarry School Days, The Prospector, The Doctor, The Angel and the Star, The Foreigners* and *Corporal Cameron.*

Gordon, John Brown (1832-1904), soldier and governor of Georgia, born in Upson County, Ga. He graduated from the University of Georgia, and was admitted to the bar, but when the Civil War began he enlisted as captain in the Confederate army, rising steadily by meritorious service to the rank of lieutenant-general. He served in the United States Senate from 1873 to 1880, and again from 1891 to 1897. Meantime he was governor of his state from 1887 to 1890. He gained a wide reputation as a popular lecturer on war topics.

Gore, Thomas Pryor (1870-), a United States senator, born in Webster County, Miss. In his childhood he lost the sight of both of his eyes. He attended school, however, and went to college, graduating from the law department of Cumberland University. Leba-

non, Tenn., in 1892. In 1896 Mr. Gore moved to Texas, and in 1901 to Oklahoma, where he was for one term a member of the Territorial Senate. He was also one of the first two senators from the State of Oklahoma, being elected in 1907, and he was reelected in 1909 for the full term. As one of the leading statesmen of Oklahoma he has taken a prominent part in shaping the institutions of the state. He is also a pleasing and effective speaker.

Gor'gons, in Greek myths three huge sisters with snaky hair, teeth like swine, and claws of brass; and wearing golden wings on their scale-covered bodies. All who gazed on them were turned to stone. Perseus beheaded the Gorgon, Medusa; but her two sisters were immortal.

Goril'la, a fierce, untamable ape of the Simian Family. It is found only in a small part of central and western Africa, where its home is in the depths of the forest, although it lives chiefly upon the ground and is not given to climbing. The male gorillas are much larger than the females and are unusually powerful animals, with long arms and huge lower limbs. The presence of a heel is more pronounced in this species than in any other ape, and the little toe is more feeble. The canine teeth are lengthened into ferocious-looking tusks. The face is without hair and is black or at least dark in color, and the ears are exceedingly small. The brain of the gorilla is larger than that of any other ape, and in many respects this species is considered the nearest to man. Were it less ferocious so that its habits in its native haunts might be more closely studied, it might be found to be of greater intelligence than at present supposed.

Gor'ky, Maxim (1868-), the pen name of the Russian novelist, Alexei Maximovich Pyeshkov, born in Nizhni-Novgorod. He lost both of his parents in his childhood, and in his ninth year was put to work in a boot shop. For a number of years he engaged in various callings, but finally became secretary to a barrister in his native town, and soon turned to literature. His scenes are generally tragic; his favorite character is a man in open rebellion against society; the atmosphere of his books is pessimistic. He wrote *Foma Gordeyev, The Peasant, Makar Chudra, Konovalov* and a play, *At the Lowest Depths.*

Gorman, Arthur Pue (1839-1906), an American senator, born in Howard County, Md., where he secured his education. From 1852 to 1866 he was a page in the United States Senate. He was also postmaster of the Senate. After serving for some time as collector of inland revenue for the Fifth District of Maryland, he was sent to the Legislature, where he served from 1871 to 1881, a part of this time being speaker of the House. He was elected to the United States Senate in 1881, 1886, 1892 and 1903. He assumed an important part in the tariff legislation of 1894 and during the latter years of his service was a leader of the conservative Democrats.

Gorse, a low shrub of the Pulse, or Pea, Family, growing in great profusion on barren, sandy lands of the Old World and found on sterile soil of eastern United States. It is a branching, somewhat thorny shrub, rarely growing to a height of five feet. The leaves are few and small, generally being composed of three rather long-oval leaflets. The flowers grow in long, drooping clusters and are bright yellow in color. Like the flowers of most members of this family, these are irregular in shape but are often very beautiful. The fruit is a flat pod.

In the Old World, gorse is used for fuel and for fodder for cattle; here it serves mainly to cover otherwise barren tracts. Gorse is also frequently known as whin and furze.

Goshawk, *Gos' hok",* a bird of the Hawk and Eagle Family. The American goshawk is about 24 inches in length and may be recognized by the black patch on top of the head, a white line over the eye, the bluish-gray wings, tail and upper parts, and the white, gray-streaked and barred under parts. The American goshawk closely resembles its relative, the European goshawk, which was so much

used for catching hares when falconing was in fashion in the Middle Ages. It is a bird of great speed when flying and is usually bold in hunting, qualities which made it of great value as a falcon. It is said to prey, to some extent, on poultry. The nest is placed usually in tall evergreens. Two to five bluish-white eggs are laid. This goshawk ranges from the northern part of the United States to northern British America. See FALCONRY.

Go'shen, Ind., a city and county seat of Elkhart Co., 25 m. s.e. of South Bend and 112 m. e. of Chicago, on the Elkhart River and on the Lake Shore & Michigan Southern, the Cleveland, Cincinnati, Chicago & St. Louis and other railroads. The city has important agricultural interests, and hay, grain and live stock are largely shipped to other markets. The chief industrial establishments include machine shops, flour mills, iron foundries, woolen mills, furniture and veneering factories and manufactories of rubber goods, mittens, shirts, underclothing and farm implements. There is a fine public library and high school building. Population in 1920, 9,525.

Gosnold, *Gos' nuld,* **Bartholomew** (-1607), an English voyager to America. In 1602 he commanded an expedition which had been fitted out, partly at least, by the Earl of Southampton, and which coasted the shore of New Hampshire and Massachusetts. He built a hut on one of the islands off southern Massachusetts, loaded his vessel with sassafras and returned to England. Raleigh confiscated the profits of the expedition by virtue of his patent. However, Gosnold was instrumental in organizing the London Company, and returned to America with its first expedition in 1607. He died of fever shortly after reaching Virginia.

Gospels, The, the name by which the first four books of the New Testament are known. The word means good news, referring to the joyful nature of the message of salvation from sin and its consequences, brought by Jesus to mankind. The first three, *Matthew, Mark* and *Luke,* are called the Synoptic Gospels because they follow the same tradition of the life of Jesus,—"view it together," which the word means. The Gospel by John differs from the other three in its general treatment.

These four Gospels contain the history of Jesus and the record of his teaching, and are now the nearest approach to the original records covering this ground. They constitute, therefore, the primary sources of Christianity and are, consequently, the most vitally important of all the books of the Bible. They were written by the men whose names they bear, two of whom, Matthew and John, were members of the apostolic band; while Luke knew Jesus personally and Mark was intimately connected with the circle of early disciples. The Gospels are therefore well authenticated.

The Gospel of Matthew was written more particularly for Jewish readers and emphasizes the fact that Jesus as the Messiah fulfills the Old Testament prophecy concerning him. Another noticeable feature is the grouping of the teachings of Jesus, as in the case of the Sermon on the Mount and the parables. The book is supposed to be based upon an earlier work by Matthew known as the *Sayings of Jesus.*

The Gospel of Mark is probably the earliest of the four in point of time. It is also the shortest and most concise, the story moving forward with much picturesque vigor of style. Jesus is presented as the man of power who brings things to pass. There is an early statement to the effect that Mark wrote the Gospel as it was given him by Peter.

The Gospel of Luke is also directed more particularly to Gentile readers. It is more deliberate and extended than the Gospel of Mark. Luke says in his preface that he was not only himself familiar with the course of events, but that he had also carefully examined what others had written on the subject. He probably had before him Mark's Gospel and the earlier edition of *Sayings* written by Matthew, as well as other records now lost.

These three, the Synoptic Gospels, pre-

sent the phases of Jesus' teaching that group themselves about the conception of the Kingdom of God, which is of central importance. *The Gospel of John,* on the other hand, is presented under the aspect of eternal life. He thinks of Jesus as the one who brings the eternal life of God to men and who exemplifies that life in human form on earth. It is the last of the four Gospels, probably written when John was an old man, and from the vantage point of his long and varied Christian experience.

Göteborg, *Yu"te bor'y,* **Gottenburg** or **Gothenburg,** *Got' en burg,* a city of Sweden situated upon an arm of the Cattegat and having the most shipping of any Swedish port. Having a fine harbor almost entirely free from ice throughout the winter, it is next to Stockholm the most important city of Sweden. The Old Town in the center of the city has yet the remains of its once necessary fort, while the outer New Town is modern and offers great contrast to the section which it surrounds. Recently new fortifications overlooking the bay have been commenced. The city has many intersecting canals, interesting cathedrals and fine botanical gardens. The chief industries are shipbuilding, weaving, dyeing, spinning and the manufacture of upholstery, curtains, paper, cigars, shoes and sugar. Population, 167,813.

Goths, an ancient Teutonic tribe that lived near the Black Sea, north of the Danube, when they first appear in history. They were driven by the Huns to press into the Roman Empire about 250 A. D. and had built up a vast kingdom in Europe by the fourth century. About 369 they had divided into the Ostrogoths, or eastern Goths, and Visigoths, or western Goths. Alaric, King of the Visigoths, devastated the Peloponnesus in 396 and sacked Rome in 410. He died the same year, and the Visigoths settled in the south of Gaul and in Spain. Roderick, their last king, was slain in battle with the Moors in 711.

Theodoric, King of the Ostrogoths, invaded Italy in 489 and overcame the Teutonic chief, Odoacer, in 493. He established a new Ostrogothic kingdom in Italy, but a short time after his death, in 526, the Goths were driven out of the country by Justinian; they eventually disappeared from history.

Goucher College, at Baltimore, Md. (1885). In 1884 the Baltimore Conference of the Methodist Episcopal Church, in commemoration of the centennial of that church in Baltimore, decided to establish a college for women, and the institution was opened to students in 1888, as the Woman's College of Baltimore. It has a fine site, excellent buildings, and properties valued in all at about $1,500,000. Approximately one-third of this total represents the benefactions of John F. Goucher, D. D., LL. D., formerly president and more recently president emeritus, whose name the college took in 1910. The entrance requirements are identical with those of the best public institutions and its courses lead to the degree of bachelor of arts. Its library contains some 12,000 volumes. The annual income is approximately $175,000. There are about 350 students. See WOMEN, COLLEGES FOR; FLORIDA STATE COLLEGE FOR WOMEN.

Gough, *Gof,* **John Bartholomew** (1817-1886), popular temperance lecturer, born in Kent, England, died in Philadelphia, Pa. He came from England to this country when about 12 years of age, worked on a farm in Oneida County, N. Y., and later worked in a bookbindery in New York City. Here he formed the liquor habit, and suffered so keenly from it, both physically and mentally, that the memory of this period fired his eloquence in later years when, having overcome the habit, he took the lecture platform in the interests of temperance. His writings are full of popular interest.

Goujon, *Goo"zhon',* **Jean** (about 1520-about 1566), a French sculptor connected with the court of Henry II. He executed many of the carvings and reliefs of the Louvre and is also remembered for his illustrations of some of the books of his time. His best-known works include

the marble columns supporting the organ of the Church of St. Maclou at Rouen; the *Victory,* over the chimney piece of the Salle des Gardes de Écouen; the bust of Diana de Poiçtiers at Versailles; the Fountain of Diana, now at the Louvre; and the bas-reliefs and carvings of the Fontaine des Innocents. Goujon disappeared from court in 1566 and is believed to have been dismissed in company with other reformers; that he died during the massacre of St. Bartholomew's Day, in 1572, is no longer believed.

Gould, Helen Miller. See SHEPARD, HELEN GOULD.

Gould, Jay (1836-1892), an American capitalist, born in Roxbury, N. Y. Early a bookkeeper and a surveyor, he became interested in a lumber and tanning business in 1856, later purchased railroad stocks, which he disposed of profitably, and in 1859 removed to New York City, there becoming a broker and dealing at first in Erie Railroad bonds. From 1868 to 1872 he was president of that company. While president of the Erie Company Gould became heavily interested in other roads and in telegraph companies, and upon his retirement from the Erie Company he applied his attention to the Pacific railroads, to the New York elevated railroads and to the Western Union Telegraph Company, in the founding of which he was a prime mover. He was responsible for the "Gould System" of roads. He left a fortune of about $70,000,000.

Gounod, *Goo"no',* **Charles François** (1818-1893), a French composer, born in Paris, a son of the painter F. L. Gounod. He studied under Reicha, Halévy and Lesueur at the Paris Conservatory, and in 1839 won the Grand Prix de Rome. In Rome he studied sacred music, and in this form of composition rose to his greatest height. He wrote some delightful and vivacious comic operas and developed the lyric drama beyond the point previously reached, and introduced a new note in the music of romance. Many of his inventions are embodied in *Faust,* which, with its charming harmonies, was a familiar type of French opera for many years following its production. Other well-known works of his are the operas *Romeo and Juliet, Mireille* and *Philémon et Baucis;* the oratorios, *The Redemption* and *Death and Life;* and the masses, *Messe de Sainte Cécile* and *Messe du Sacré Cœur* and the famous *Ave Maria.*

Gourd, a family of climbing vines with large leaves having pointed lobes; many members of the family are the source of familiar fruits and vegetables, as the melon, cucumber, squash and common gourd. The fruits of the last-named vine are hard, thin-shelled berries, which take peculiar shape in different varieties of the plant. When ripe, they are yellow in color, and their queer shapes have led to their being put to various uses, as for dippers, bottles, ladles and dishes of all sorts. When the fruit is thoroughly dried, the enclosed seeds become loose within the shell, and a home-grown rattle is thus easily made. The gourds have received their names from the shape of the fruit and are known as bottle gourds, dipper gourds, etc. The calabash tree of Africa is sometimes called the gourd because its fruit is also of use in making dishes. See CALABASH TREE.

Gout, a disease characterized by intense pain in the foot or knee joints. The causes of the disease are not definitely known, but its prevalence among the rich has led to the conclusion that a contributory cause may be the indulgences and luxuries enjoyed by most members of that class, such as idleness, highly seasoned and nitrogenous foods, certain wines and liquors. The local affection is due immediately to the deposition of uric acid in the joints. Gout is a disease which attacks only adults, occurring after the age of 35, if hereditary, as is frequently the case, or earlier, if acquired. At the termination of a fit of gout, there may be a complete restoration to health and greater bodily vigor than before. Although gout is most common in the foot, it may affect the cartilaginous structure of other parts of the body, as the articular cartilage of the eyelid, larynx and ears, and ligaments of the joints.

Government, the directing or managing such affairs as concern all people alike, or the organization through which these affairs are managed. Specifically the term is most commonly used as a condensed expression for political government, or the authoritative regulation of the affairs of a political community or state.

The first form of social organization resulting in a form of government was one through which all races of people passed, the tribal state of society. There can be no exceptions to this rule. A fully organized tribe, however, was a complicated organization. The divisions of a tribe were the phratry and the gens. Above the tribes was in some instances the confederacy of tribes. The shadowy empires of ancient history,—Assyrian, Babylonian, and Egyptian, etc.—were not empires in our sense of the word. They were instances of one warlike tribe, possibly powerful confederacies, reducing to a subject state other tribes. In a tribal state the organization for government rested on personal relations.

As civilization developed and the tribes settled in a well defined section of country, this purely personal relation was not sufficient and the historic people of Europe had to feel their way to political society in which the organization for government is based on territory. This seems to us a perfectly natural step to take but it required many years of experiment and the services of eminent statesmen to effect the change in Greece and Rome; then in the early centuries of our era, one after the other, the various people of Europe effected the same change.

At present the advanced nations of the world are, and have been for centuries, organized for government purposes on territorial units. Under that form of government great advance has been made in science and in all the essentials of our present civilization. But all thoughtful students know that there are certain tendencies at present that seem to indicate still another form of social organization for government purposes. State Socialism would be such a change; one possible form would be the Soviet system of government (see SOVIET). It will be noticed that such a change is away from territorial units, and a partial return to personal relations, a government of different groups, for different groups, by different groups.

In a tribal state tribal officers, chiefs of all kinds, were elected. The inevitable tendency was for such offices to pass by inheritance. This tendency became more pronounced when political society supervened and the result was the separation of the people into classes, this was the condition in which all European people were placed before many centuries had passed and the troubled unrest in Europe of recent centuries, attended often with bloody scenes, was due to the efforts of the masses of the people to recover a fuller measure of personal liberty enjoyed in primitive times. We can trace the effects of this series of revolutionary movements in the history of every European nation.

The forms of political government are varied. When the sovereign authority is vested in a single person that person is properly a monarch; when this person rules alone with no restriction on his authority he is an absolute monarch. There is now no example of an absolute monarch in Europe. When there are restrictions on his authority his rule is said to be that of a limited or constitutional monarch. There are now only a few constitutional monarchies in Europe. A king is simply the monarch of a country that is designated as a kingdom. An Empire is a monarchy that possesses a large area and includes a number of states under its rule. The only country answering to this description now is Great Britain.

Notice the cycle of evolution in political society; from absolute monarchy, through limited monarchy to democratic republics,—a form of government which now prevails in 75 per cent of European territory.

DEMOCRACY. According to Lincoln's definition democracy is a government of

the people, by the people, for the people, and is the form in which the people either directly, or through their representatives, are supreme. Ever since the rise of popular education in the last century and its vast development thereafter, the advance of democratic opinion and the spread of democratic institutions have been most significant. The fundamental basis of democracy is the recognition of the rights of man as man. Its central principle is the equality of all men before the law, without regard to birth, property or social rank, and it may be likened to a state of society absolutely without class distinctions made by laws or customs. The town meeting still in existence in the New England States is the only representative of true democracy in America. In these states the voters of each town assemble once a year to choose town officers and transact any other business pertaining to the town's interest.

Republic, a form of political organization in which the principal agents of government are chosen by qualified electors. Such electors may comprise the whole adult population of the state, or all qualified male citizens, or a small group of persons exercising a constitutional or hereditary power of election. In the earlier republics of Greece and Rome the supreme power was vested in the whole body of the citizens who met in common assembly to enact their laws. In all modern republics the representative system prevails, the right of suffrage being liberally granted, but the duties of the administration are confined to a chosen few. In the Western Hemisphere the republican form of government prevails in all independent states.

The United States is a Federal republic consisting of a number of separate states, united by a constitution, under a central government, with power to enact laws binding on all the citizens. Up to the time of the Declaration of Independence the title employed had been United Colonies; after that it was the United States of America. See United States, subhead *Government.*

State Government. The Constitution of the United States provides that all powers not delegated to the United States nor prohibited by it to the states are reserved to the states respectively or to the people. Among the powers prohibited are the conclusion of treaties, alliances, or confederations, the coining of money, etc. A close study will reveal the fact that the relation of the citizen to the state government is far more close than to the Federal Government. The fundamental law of each state is embodied in a constitution drawn up by a constituent convention and ratified by the electorate at the polls. The position of the heads of the state executive departments is in no sense similar to that of the president's cabinet. The governor has little direction over them and their responsibility is to their constituencies.

Local Government. In the United States there are three general types of local government. They are the town system in New England, the county system in the South and the mixed system in New York, Pennsylvania and New Jersey, and a number of the North Central States. In the main, however, the laws that touch most closely our daily life are left to the states, and of late there is a movement in some of them towards direct legislation under the initiative and referendum. See Initiative, Referendum and Recall.

Governor, in mechanics a device for controlling the running speed of a steam engine, gas engine, water motor, etc., or keeping the speed of a machine constant within practical limits. In its application to a steam engine, the object of the governor is to act, so that the supply of steam to the cylinder is proportional to the load. The ball governor, or that commonly used on steam engines, depends on balancing the centrifugal force of a revolving mass either against gravity or against the force of a spring.

The original governor, as designed by Watt, consists of two balls fastened to two inclined arms, which are joined to an upright spindle so that the balls can move in a vertical plane. The spindle

is geared so as to revolve with a speed proportional to the engine, and as the speed of the spindle increases, the balls fly out and rise. For a definite speed the balls have a definite position, and below this speed they fall, beyond it they rise. Attached to the sleeve, which is actuated up and down by the balls, are suitable levers and links operating the steam-supply valve. The modern high-speed steam engine for close regulation employs a governor, consisting of a heavy mass on a lever, attached to a spoke inside the flywheel and held toward the center by a spring. As the speed increases, the spring is stretched and the mass flies out, giving a movement to the eccentric across the shaft, which operates the valve to the steam supply of the engine. See STEAM ENGINE; GAS ENGINE; WATER TURBINE; PHONOGRAPH.

Governor's Island, an island of New York Harbor, lying two-thirds of a mile south of the mainland and separated from the Borough of Brooklyn by Buttermilk Channel. It is a military and naval station and is fortified by South Battery, Castle William and Ft. Columbus.

Gow'er, John (about 1325-1408), an English poet, contemporary and friend of Chaucer. His chief work, the *Confessio Amantis* (*The Lover's Confession*), a collection of stories, has long been recognized as a classic of the English language. Gower possessed no originality, but took stories from many sources aiming to present moral lessons, and, though for the modern reader he is tiresome, his work has great philological interest. Other writings are *Speculum Meditantis* (in French), *Vox Clamantis* (in Latin) and a collection of ballads in French verse.

Goya Y Lucientes, *Go' yah e Loo" the-en' tase,* **Francisco** (1746-1828), the leading Spanish painter of the 18th century. He was born near Saragossa, and went to that city to study, later to Madrid and to Rome. His art occupied itself chiefly with the lower classes, and his representations of vagabond life are among his greatest successes. In portraiture he was equally preeminent, and painted four sovereigns of Spain—Charles III, Charles IV, Ferdinand VII and King Joseph. Among the other branches with which he occupied himself were tapestry designing, engraving and etching; and in all his technical qualities are of a high order. His works are among the prizes of European galleries.

Gracchus, *Grak' us,* **Caius Sempronius** (about 159-121 B. C.), the younger brother of Tiberius Gracchus, was one of the leading orators of his day. He won the favor of the people by a corn law by which the poor could get grain at one-half the market price, and thus began an evil system of legislative bribery. He reestablished the land commission, founded Roman colonies in Italy and sent Roman colonists outside of Italy, who were to remain Roman citizens. However, the people refused to support him when he proposed to extend the Roman citizenship to all the Latins and the Latin rights to all Italy. The Senate took advantage of this defection and brought about the defeat of Gracchus when he attempted to secure a third election as tribune. No longer protected by the sanctity which that office conferred, he was killed as his brother had been, in a street riot, the next year.

Gracchus, Tiberius Sempronius (about 163-133 B. C.), the elder of the two reformers. His father was a patrician and his mother was the daughter of the older Africanus. He early made a good war record and was honest and energetic. In his travels through Italy he was touched by the economic and moral decay he found, and devoted his life to the rebuilding of the yeoman class.

His reforms touched the very heart of the trouble. In 133 he became tribune and tried to bring about a distribution of the public lands of Italy. Much of this land had been seized and was illegally held by the rich. These large holdings were to be divided into smaller ones, given to landless men and held in perpetual lease without the right to sell. A

small rent was to be paid to the State. Although Gracchus was opposed by the Senate and the rich, his law was at last passed and a commission appointed for the distribution of the land. To complete his work he asked for a reelection, but the nobles united against him and he was killed in a riot on election day.

Graces, or **Charites,** in classic myths three daughters of Jupiter: Euphrosyne (Mirth), Aglaia (Splendor) and Thalia (Blooming One), who presided over all good, beauty, cheer and gayety. They lived with the Muses near Olympus, seemed especially devoted to Venus and were under the authority of Juno. Great worship was accorded them at Orchomenus, in Bœotia; and at Athens, Sparta and Crete, their annual festival being called *Charitesia.* They were invoked in baths and toasted at banquets.

Grackle, or **Crow Blackbird,** a name given several birds of the Blackbird Family, two of which are common in the Northern States in summer.

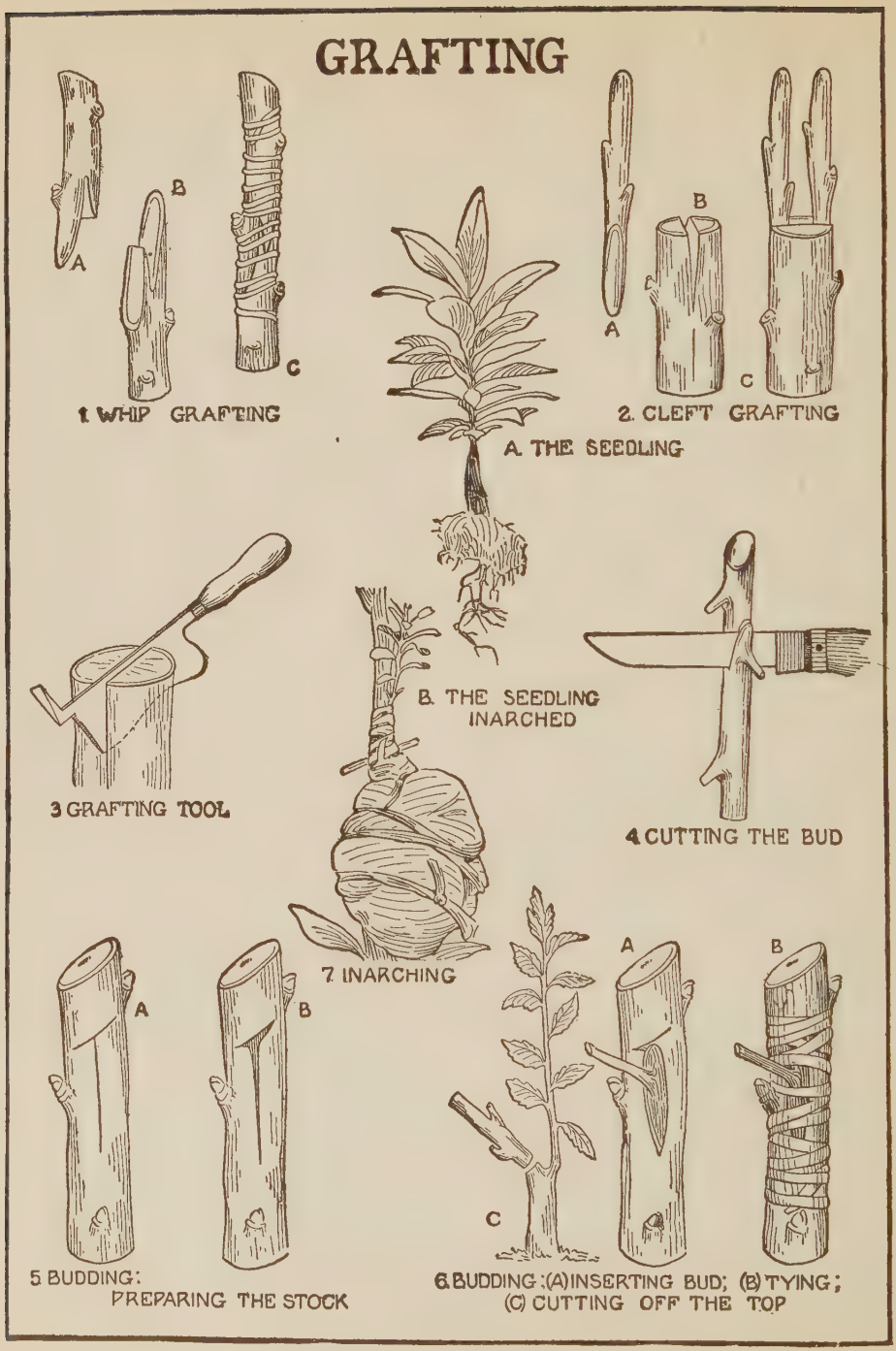
Purple Grackle. This bird is common in the eastern part of the United States. It is a little larger than the robin, being from 11 to 13½ inches long. It is black all over with metallic tints of steel-blue and purple. The female resembles the male but is not so brightly colored. The song is a collection of wheezy, rasping cries which sound not unlike the creaking of a rusty hinge. The nest is a large, bulky affair of twigs built on any kind of a support, from a low lilac bush to an evergreen tree 50 or more feet above the ground. The birds nest singly or in colonies, and three to seven brown-spotted eggs are laid.

Bronze Grackle. This bird resembles the purple grackle very closely in size and in habits but its color is nearer bronze than black, as indicated from the name.

Gra'dy, Henry Woodfen (1851-1889), an American editor and author, born in Athens, Ga., and educated at the universities of Georgia and of Virginia. He entered journalism shortly after the Civil War and as editor and correspondent of various publications attracted wide notice, chiefly for articles relating to the rehabilitation of the South. Because of an able article on the possibilities of Georgia, which appeared in the Atlanta *Constitution,* he was made correspondent for the New York *Herald.* Later he became interested in the Atlanta *Herald* and in 1882, with $20,000 loaned him by Cyrus W. Field, he purchased a quarter interest in the Atlanta *Constitution,* of which he became managing editor. He was widely famed as an orator, especially on the subject of "The New South." The Grady Memorial Hospital of Atlanta testifies to Southern appreciation of Mr. Grady's devotion to the South.

Graft, in politics and business a slang word used to denote money or other valuable consideration above the legal fee or stated remuneration for services rendered. Grafting is considered dishonest, because the one accepting the bribe is expected to make some adequate return to those who thus force him. The worst forms of grafting are those connected with elections and those used to secure the passage of bills favoring certain methods by state Legislatures. As a check upon the former, some states have laws compelling candidates for office to publish sworn statements of all election expenses and of the sources and amounts of all campaign funds received.

Grafting, the process of inserting a portion of one plant into another with the object in view of having the new plant grow upon the foster-parent root. Its advantages are so numerous and the seeming wonders that have been accomplished by it are so many that grafting has become a matter of common knowledge to the nurseryman, who uses it especially in the production of choice fruits. There are four chief purposes of grafting. 1. For some reason many plants are not readily reproduced; perhaps they produce no seed or the seeds which they do produce are not easily germinated; other plants bear seeds which do not "come true," that is, the plants grown from the seed differ from the parent and from each other. If plants of this sort cannot be propagated by cuttings or lay-



METHODS OF GRAFTING

ings, grafting is the only means left to reproduce the plant. 2. Grafting increases the speed and the ease with which the plant may be multiplied, since the new growth is borne upon old roots, and neither time nor food need go toward root production. 3. A new variety of plant may be developed having attributes of the two plants which have been united by grafting. 4. Plants may by this means be adapted to adverse conditions of soil and climate.

The process of grafting is not at all difficult and may be done by a boy with his jackknife, if he learns a few of the necessary steps. The plant upon which the new cutting is made to grow is called the stock; the plant from which the cutting has been taken is called the cion, or scion; the newly-grown plant is the graft. The process by which the two are united is variously known as graftage or grafting. The limits of grafting may be learned only by direct experiment. It is generally conceded that members of the same species are most easily grafted with success, while more distantly related plants of the same genus are more apt to be failures. This, however, is not wholly true, since members of widely differing genera have been successfully propagated in this manner. A stone fruit, however, is not successfully grown upon a tree of seed-bearing fruit. Experiment and study are by far the best means of determining the possibilities of grafting, which generally exceed the limits that would be set by botanical classification.

Grafting is done at different times according to the locality, the plants, the climate and the object to be accomplished. Under ordinary conditions cuttings are made in the autumn and kept in a cool but not a cold place, until the following spring, when they are placed upon the stock.

Methods of Grafting. There are as many methods of grafting as there are ways of whittling a stick, as shown in the illustration; one thing alone is necessary, that the cambium, or growing layer, of the cion is joined to the cambium of the stock. This layer is the living tissue through which the sap rises, and upon its continued growth depends the success or failure of the operation. The methods of grafting are ordinarily grouped under one of three heads, known respectively as bud grafting, or budding, cion grafting, or merely grafting, and inarching.

Bud Grafting. The first of these, budding, consists in inserting a bud of the cion beneath the bark of the stock. A healthy bud of the cion is cut by placing the thumb at the base of the bud and cutting a rounding section which, beneath the bud, includes a bit of the wood also; the wood is, however, often removed when the grafting takes place. The stock is prepared for the insertion of the bud by cutting the bark in T-shape and loosening the flaps. Beneath these the bud is placed, and the entire limb is bound with yarn, raffia, or some slightly elastic twine which will not cut the bark and which will allow it to expand as it grows. No other attention is needed after seeing that the bark is tightly bound in place.

Cion Grafting. This is done in so many different ways that many special names have been applied. The methods are called root, crown, stem, top and twig grafting, according to the place where the grafting is done, or they may be named from the manner of grafting, as cleft, bark, twig, veneer, herbaceous and whip grafting. In cleft grafting the cion is taken from last year's shoots which have at least three buds. These shoots are left dormant during the winter and are made use of in the spring. The bark of the stock is split and the twig inserted to such depth that the lower bud is covered with the wax that covers the wound. However, the lower bud, being the nearest the source of supply, is the most apt to grow and pushes its way through the surrounding wax. Cleft grafting is oftenest used where the top of a tree is to be changed in form or in variety. Three or four years are necessary for changing a tree to a new variety. Bark grafting is made use of

when large limbs are used on the stock. Here only the bark is split and small branches from the cion are inserted. Whip grafting is used when branches of the cion are the same size as those of the stock. The cut is made in a variety of ways in order to hold the two branches firmly together. Veneer grafting is often done by nature. It consists in the rubbing together of two branches until the cambium layers are united. It is used by nurserymen chiefly to produce odd-shaped plants or conventional designs. Herbaceous grafting is similar and is used in greenhouses in uniting plants like geraniums and other house plants. It can be done only in close, moist rooms. In all methods of cion grafting, the wound made is firmly covered with grafting wax. This may be made by melting together one pound of rendered tallow with two parts of beeswax to four parts of resin. As soon as the ingredients are fully melted and mixed, pour the mixture into a pail or tub, where it will immediately solidify. It should then be pulled until it becomes light-colored and forms a grain. It may be kept indefinitely and will soften with the warmth of the hands. The hands should be greased before handling it in order to keep it from sticking.

INARCHING. This is the most interesting means of grafting, and by it seeming marvels have been accomplished. It has been of especial aid in the scientific development of new fruits, since it hurries the fruiting time of slowly developing plants, and thus great length of time is not spent upon experiments which in the end prove to be worthless. The process of inarching is here given. The seedling is grown for three or four weeks until it has a slender stem and some half-dozen weak little leaves. If left to itself, many years would be necessary to bring it to maturity so that it could produce flowers and fruit. The seedling with the ball of earth about its roots is taken up and transferred to a nurse tree. The outer bark of both nurse tree and nursling are scraped off and the two wounds are bound together with broad, soft bands of cloth; the dirt, too, is closely bound to the yet uninjured roots of the seedling, and the whole is left to itself to finish the process. After a few weeks the seedling begins to feed upon the nurse plant; then the soil may be removed, the roots are carefully trimmed off and the two are one plant. A little later the top of the nurse plant is also removed and the strong vigorous roots, with the wealth of food that they take up, send all their nourishment to the youthful foster branch. Thus the new plant fruits long before its time and bears as abundant and as strong fruit as though it had grown to maturity by natural means.

The benefits derived from this are enormous, although they are as yet only partially developed. A good example is that of the finger lime, a tree of the Citrus Family, which ordinarily requires eight years to reach maturity. Seeds were sent to the United States Department of Agriculture and were there duly planted in order to discover if the fruit were available for this country. The young seedlings that developed were inarched upon a vigorous lemon tree, and in two years finger limes were produced that were found to be valuable for growth in the Southern States. Other fruits which have been studied through inarching are the citrange, produced by crossing the citron and orange and then growing the resulting seedling upon a vigorous orange root, and the tangelo, a cross between the tangerine and the pomelo, or grapefruit. Although the crossing of the last two named produced fertile seed, science could not wait for the necessary years to elapse in order to learn whether the fruit produced had the juiciness of the grapefruit and the sweetness of the tangerine, as well as its easily removed skin. By inarching, the fruit was produced in two years and proved to be all that was expected of it.

One other way in which inarching has proved invaluable has been in the propagating of the lemon upon the hardy mock orange of the North. The lemon has leaves which retain their sap throughout the winter, and in cold cli-

mates the sap freezes, thus killing the plant. The lemon inarched upon the mock orange, however, produces leaves which fall during the winter, while the sap sinks to the roots until the cold weather is over. The fruit borne in this manner has the qualities of the lemon and the added value of being produced upon a Northern tree. The wonders accomplished by this treatment of plants are probably only a foretaste of what may be expected. The years of waiting that have been necessary for the scientist and the almost certain chance that death would come before the experiment was completed, are obstacles no longer. The experiments have been conducted by the United States Department of Agriculture, and pamphlets concerning this and other grafting work carried on in the department may be had upon application to the secretary of the department at Washington, D. C. See CROSS-FERTILIZATION.

Grafton, W. Va., a city and the county seat of Taylor Co., 99 m. s.e. of Wheeling, on the Tygart's Valley River and on the Baltimore & Ohio, four divisions of which terminate here. Coal and natural gas are among the city's resources. There are railroad shops, machine shops, flour mills, cigar factories, planing mills, factories for the manufacture of window glass and pressed glassware, gristmills, wholesale grocery and wholesale drug establishments. Near the city is a small national cemetery; and at Pruntytown, four miles distant, is located the state reform school. Settled in 1852, Grafton was incorporated in 1856, and in 1899 was chartered as a city. Population in 1920, 8,517.

Graham, Sir Hugh (1848-), a Canadian journalist, born and educated in the Province of Quebec. In 1869 he founded the Montreal Daily and Weekly *Star,* to which he has given the best efforts of his life, and which, without allegiance to any political party, he has made one of the most influential papers of Canada. Sir Graham has been active in the cause of municipal and political reform, in 1908 being knighted by King Edward in recognition of his services in public and philanthropic enterprises.

Grail, The Holy, the legendary cup from which Christ drank at the Last Supper. Numerous legends center about this cup, which has been the theme of many a song and story. The incidents usually given are these. It was brought to England by Joseph of Arimathea, and handed down from generation to generation until, owing to the sin of one of its keepers, it was taken back to heaven. According to some accounts the Grail was visible only to the pure, but another version was that it struck blind any impure person who looked upon it. It was the favorite aim of the knights of King Arthur to find the sacred cup and become its guardian. One version of the legend represents three of Arthur's knights, Galahad, Perceval and Bors, as having seen the Grail. To the French romancers of the 12th century the legend of the Grail was a fascinating theme, and in the 15th century it was interwoven in the *Morte D'Arthur* of Sir Thomas Malory. The greatest medieval work on the subject was the *Parzival* of the German poet Wolfram von Eschenbach. For 250 years following, the Grail story figured largely in Arthurian literature, and experienced a revival in the 19th century. The best known of the modern treatments of the legend are Tennyson's *Holy Grail,* which is one of the *Idylls of the King,* and Wagner's musical drama, *Parsifal* (See PARSIFAL). Lowell has made use of the Grail story in his *Vision of Sir Launfal.*

Grain Drill, a machine for sowing seed by drilling a number of furrows at once. It consists of a narrow box forming a hopper about seven feet long, having a number of circular openings in its bottom, placed crosswise on the machine. The openings are spaced about four inches apart to correspond to the distance between furrows, and connected with openings are rubber tubes extending within two inches of the ground. In front of each tube is a sort of cast-iron plow, called a lister, with a flange at its rear to guide the rubber tube. Some-

times there is a small wheel following the lister for the purpose of covering the seed as it falls into the furrow. In the hopper is a revolving brush, so geared to the wheel supporting the machine that any desired quantity of seed may be gauged and distributed through the tubes into the furrows. This machine is usually drawn by two horses, and it will seed from eight to ten acres per day. It is used quite generally for sowing wheat, oats, rice and other grains. See SEEDER; CORN PLANTER.

Grain Elevator, a building specially designed and constructed for storing, handling and cleaning grain preparatory to its shipment. These buildings are always located with reference to good transportation facilities. An elevator usually consists of a number of large bins in which grain may be stored, surmounted by a structure called a cupola, in which the grain-handling machinery is located. The various spouts for loading and unloading the grain have their common center in this cupola, from which they extend to all parts of the elevator. Cleaning and sometimes grinding machines, together with the motive power, whether of a steam or gasoline engine, are located on the ground floor of the building in order to be convenient to fuel.

The improved form of elevator consists of one or more large cylindrical tanks constructed of concrete on a cement or brick foundation, so as to be fireproof, and surmounted with a cupola of steel framework covered with iron roofing. Grain is unloaded from cars by having a large shovel operated by means of a rope and a windlass, which pulls the shovel along the bottom of the car and empties it into a hopper below the tracks. Here, elevator buckets riveted to endless belts or chains scoop up the grain and carry it to the cupola, where it is distributed through a spout to the desired bin in a story below. An upright shaft with a pointer shows to what bin a spout is directed.

For unloading ships or barges a suction fan is sometimes used, or a leg carrying a movable box or boot, in which there is an endless belt passing over a pulley at each end and provided with metal elevator buckets. This leg is arranged to swing down into the hold of the barge or ship and scoop up the grain. For loading cars or vessels the grain is first elevated to the top of the building and by gravity spouted to the car or vessel desired. By a special device the grain can be weighed as it is loaded. A large elevator will hold 1,000,000 bushels of grain and is capable of handling nearly half that much per day. Those of the largest capacity are located in Chicago, Superior, Wis., Minneapolis, Minn., and at different ports on the Great Lakes.

Gram. See METRIC SYSTEM.

Grammar, that branch of the science of language which treats of the forms of speech in languages and the relationship of these forms. It may be divided into didactic, historical and comparative grammar. Didactic grammar establishes rules of good usage in a given period; the grammars in general school use belong to this type. Historical grammar treats of language from the point of view of historical development, presenting facts only and laying down no rules of correct usage. Comparative grammar is also more or less historical in method and compares the forms of different languages grouped together for this purpose. Divisions of didactic grammar are orthography, or the proper spelling of words; etymology, or a treating of the parts of speech with their inflections; syntax, or the relation of words in sentences; and prosody, or the laws of versification.

Gramophone, *Gram' o fone.* See PHONOGRAPH.

Gram'pus, a member of the Dolphin Family found in the Northern seas of America. It is distinguished from other members of the family by having teeth only in the lower jaw. The grampus is not as common as the dolphin, porpoise and narwhal, but is more disliked because of its voracity in destroying fishes and even small whales. See DOLPHIN.

Granada, *Gra nah' da,* a Spanish province, about the size of Connecticut

and once a part of the ancient Moorish Kingdom of Granada. It lies in Andalusia in the southern part of Spain and has about 50 m. of seacoast on the Mediterranean. Within it lies Mulhacén (11,420 ft.) of the Sierra Nevada range, the highest peak of the Iberian Peninsula. The soil in this part of Spain is fertile and the province produces an abundance of good wheat, maize, barley, wine, oil, flax, cotton, silk, fruit of nearly every kind and, since the loss of the Philippines by Spain, both beet and cane sugar. There are valuable mineral deposits and the iron mines are especially well developed; tanneries and foundries also are numerous. The great highways, which were built in the time of Moorish domination, are still in good condition, but other roads are few and poorly kept.

The Kingdom of Granada was destroyed by the invasion of Ferdinand and Isabella, begun in 1481, and by the treaty of surrender ten years later Moorish power in Spain was forever broken. The chief towns of the province are Granada, the capital and a city of historic importance; Baza, Guadix, Loja, Montefrio and Motril. Population, 503,900.

Granada, a city of Spain, the capital of the Province of Granada, situated about 225 m. s. of Madrid. It is at the base of the Sierra Nevada range, 2200 ft. above the sea, and the mountainous background, generally covered with snow, gives a very picturesque appearance, while the clear blue sky and the terraced hills, covered with vegetation, add further to its beauty. The towers of the Alhambra surmount the whole with impressive grandeur. The streets are mostly crooked and narrow, and the buildings, chiefly of Oriental architecture, are inferior in structure to those of other Spanish towns. Prominent buildings are the Alhambra (See ALHAMBRA, THE), a summer palace of the Moorish princes, the Church of San Jeronimo, the Cathedral and the university (founded in 1531). The manufactures of the city include paper, leather, textiles, liquors, starch, chocolate and macaroni. The commerce consists principally of the transportation of the agricultural products of the fertile Vega of Granada.

Granada was mentioned in accounts by early Arabian authors. During the eighth century it was occupied by the Saracens, and after the 13th century, when it became the capital of the kingdom, it developed into a city of great splendor and power. In 1492 it was forced to surrender to the Christian sovereigns, and the Moors were finally expelled in 1609. Population in 1900, 75,900.

Grand Army of the Republic, an organization of the veterans of the Civil War, founded in Decatur, Ill., Apr. 6, 1866, largely through the initiative of Dr. B. F. Stephenson and Chaplain W. J. Rutledge of the Fourteenth Illinois Infantry. Membership is open to any officer, soldier or sailor of the United States army, navy or marine corps who served between Apr. 12, 1861, and Apr. 9, 1865, and was honorably discharged, and also to members of state regiments who were called into active service and were subject to orders of the United States officers. The purposes of the organization are patriotic, fraternal and philanthropic. The official badge is a small strap and ribbon showing the American flag, from which is hung the star of the membership badge. This star shows a medallion on which are a soldier and sailor in relief, clasping hands in front of a figure representing Liberty. The medallion is also wrought into a button, which is worn on the lapel of the coat.

The Grand Army is organized into local posts and departments representing the states. These departments combine to form the national organization. The state and national departments hold annual encampments. Local posts usually hold monthly meetings. The organization has done much to relieve widows and orphans of deceased members. It was through its influence that Memorial Day was instituted. It has also been influential in establishing soldiers' homes and in securing an increase in pensions to veterans of the Civil War. Owing to

the death of the members from old age, the ranks of the order are being rapidly depleted. In 1918 the membership was 120,916. In 1911 it was 203,410. See WOMAN'S RELIEF CORPS.

Grand Forks, N. D., a city and the county seat of Grand Forks Co., 78 m. n. of Fargo, at the junction of the Red River and the Red Lake River, and on the Northern Pacific and the Great Northern railroads. Situated in the great wheat district of the Red River Valley, it is an important market for this staple and for flour, and is also an important distributing point for farm implements and machinery, and has large jobbing interests. The river traffic is considerable. Railway car shops and manufactories of brooms, tiles, cement, brick, candy and crackers are among the industrial establishments. The University of North Dakota, a coeducational institution opened in 1884, and Wesley College (Methodist Episcopal), affiliated with it, are located in Grand Forks. Acker's Business College and St. Bernard's Ursuline Academy (Catholic) are other leading institutions. The Federal Building, Y. M. C. A. Building and the public library are other important features. For its lighting, paving and park systems Grand Forks is scarcely excelled by any city of its size in the country. Grand Forks was settled in 1871 and two years later was incorporated. A city charter was granted in 1881. Population in 1920, 14,010.

Grand Island, Neb., a city and the county seat of Hall Co., 154 m. s.w. of Omaha, on the Chicago, Burlington & Quincy, the Union Pacific, the St. Joseph & Grand Island and other railroads. The city has a large wholesale trade in groceries and fruits and supports a number of retail establishments. The live-stock trade is extensive, as is also the traffic in horses. There are two broom factories here, a large beet-sugar factory, brickworks, wire-fence factories, a flour mill, canning factories and railroad shops. The city is the seat of Grand Island College (Baptist) and of the Nebraska Soldiers' and Sailors' Home. St. Francis Hospital, a public library and Grand Island Business and Normal College are other important institutions. The place was platted in 1866 and chartered as a city seven years later. Population in 1920, 13,947.

Grand Junction, Colo., a city and the county seat of Mesa Co., about 97 m. n.w. of Gunnison, at the junction of the Grand and Gunnison rivers and on the Denver & Rio Grande, the Colorado Midland, the Rio Grande Western and other railroads. It is surrounded by an agricultural region, watered chiefly by irrigation, in which fruit growing is an important industry. Grand Junction is one of the most important towns in western Colorado. It has extensive coal interests, brick and lumber yards, machine shops, flour mills, planing mills, a pyritic smelter and a beet-sugar factory. Trade is carried on chiefly in fruits, vegetables, grains and coal. The city is the seat of Teller Institute for Indians. Population in 1920, 8,665.

Grand Jury. See JURY.

Grand Rapids, Mich., a city and county seat of Kent Co., 60 m. n.w. of Lansing and 145 m. n.w. of Detroit, on the Grand River, about 30 m. from Lake Michigan, and on the Grand Rapids & Indiana, the Pere Marquette, the Michigan Central, the Lake Shore & Michigan Southern, the Grand Trunk and other railroads. A number of electric interurban lines operate in connection with the Trans-Lake Michigan boat lines to Chicago and other important ports on the west shore of the lake. The Lake Michigan resorts at Saugatuck, Holland, Grand Haven and Muskegon are easily reached by the Grand Rapids, Grand Haven & Muskegon and the Grand Rapids, Holland and Chicago interurban lines. Grand Rapids is situated in the west Michigan fruit belt and the city is the center of a great and profitable market-gardening region.

PARKS AND BOULEVARDS. The city covers an area of over 17 sq. m. and has a site of great natural beauty. East Grand Rapids, Burton Heights, Wyoming, North Park and Walker are at-

tractive suburbs. There are many miles of well-lighted, paved and shaded streets and handsome residence districts surrounded by wide lawns and gardens. The park system comprises over 459 acres, and includes John Ball Park of 100 acres, Campau, Highland, Fulton and a number of smaller parks. Reed's Lake and North Park are near-by resorts.

Public Buildings. Among the noteworthy buildings are the courthouse, Federal Building, Kent Scientific Museum, Association of Commerce, Michigan Trust, Ashton, Keeler and Murray buildings, Union Station, city hall, Elks' Temple, Manufacturers' Building, the Peninsular, Ladies' Literary, Woman's Kent County and St. Cecilia clubhouses, Masonic Temple, Y. M. C. A. Building, Ryerson Library, a number of banks, Pythian Temple and substantial business houses. There are about 120 churches, which include St. Mark's Episcopal and St. Andrew's (Catholic) cathedrals. The city is also the seat of a Catholic see and of an Episcopal bishopric.

Institutions. The educational institutions include the Holland Theological Seminary, one of the leading educational institutions of the Holland Reformed Church in America, a high school, public and parochial schools, Ryerson Library, the gift of Martin A. Ryerson of Chicago, to the city of his birth, and a large number of private schools. The benevolent and charitable institutions include the Butterworth, St. John's, St. Mary's and the city hospitals, Kendall Home for Nurses, Tuberculosis Sanitarium, Aldrich Memorial Deaconess' Home, Blodgett Home for Children, St. John's Orphan Asylum, Emerson Home for the Aged, Woman's Home and Hospital and the Michigan Masonic Home. The Michigan Soldiers' Home, maintained by the state, is located about one mile north of the city.

Industries. The extensive manufacturing industries of Grand Rapids are facilitated by the excellent water power furnished by the Grand River, which at this point falls about 18 ft., forming the rapids from which the city derives its name. The city is noted for its manufacture of furniture, being the leading city in the world in this industry, and a number of the largest buildings in the city are used exclusively for furniture-exhibition purposes. There are also tanneries, flour and feed mills, a woodworking tool factory, a paper mill, cooperages, shoe factories, foundries and machine shops, agricultural-implement works and manufactories of carpet sweepers, brass and bronze goods, confectionery, hosiery and knit goods, iron castings, leather, typewriters, veneers, fly paper, adding machines, show cases, leaded glass, band instruments, cement machines, brick and tile, embalming supplies, paper boxes, locomotive headlights, sectional bookcases, heaters, turbines and other diversified products. The city is a great horticultural and market-gardening center and an important farm-produce and fruit market. Gypsum quarries are also found in the vicinity.

History. The first settlement was made by Louis Campau in 1828, who established a trading station here with the Ottawa Indians and made the first entry of the land after the government survey. The first family to settle here was that of Joel Guild, who arrived in June, 1833, coming from Ionia. Grand Rapids was incorporated as a village in 1838 and granted a city charter in 1850. A revised charter was given in 1857. Population in 1920, 137,634.

Grand River, a river of Colorado, rising in Grand Lake in the central part of the state and flowing southwest to unite with Green River in southwestern Utah. It is about 350 m. in length, and in one part of its course flows through a deep canyon with walls from 1000 ft. to 1500 ft. in height. Its principal confluents are the Gunnison, Rio Dolores and Hudson's Wash.

Grangers. See Patrons of Husbandry.

Granite, *Gran' it,* a crystalline rock composed chiefly of quartz, feldspar and mica. Granite is one of the oldest rocks in the earth, and granite hills can usually

be recognized at a distance by their rounded appearance. In color granite varies from light gray to almost black and from light pink to a dark red, the color depending largely upon the color of the feldspar. It varies widely in texture, from coarse to fine-grained. It is very hard, possesses great strength, takes a high polish and withstands the action of the weather to a remarkable degree. These qualities make granite one of the most valuable stones. It is used extensively for abutments and piers of bridges, the walls of large buildings, for monuments and headstones and for numerous other purposes.

The granite industry in the United States ranks second in value among the building stone industries. The most extensive quarries are in Maine, New Hampshire, Vermont, Massachusetts and Minnesota. The rock is cut from the ledge in large blocks, and these are cut into various sizes, which are shaped and polished by machinery. All engraving upon granite is also done by machine tools. Syenite is a variety of granite in which the mica is usually replaced by hornblende, though in some varieties the quartz is replaced by hornblende. See GNEISS; SYENITE.

Granite City, Ill., a city of Madison Co., near the Mississippi River, 8 m. n. of St. Louis, Mo., on the Cleveland, Cincinnati, Chicago & St. Louis, the Chicago & Alton, the Chicago, Peoria & St. Louis, the Wabash, the St. Louis Merchants' Bridge Terminal and other railroads. It has iron and steel foundries, lead and enamel works and granite factories. Granite was settled in 1892. Population in 1920, U. S. Census, 14,757.

Grant, Frederick Dent (1850-1912), an American soldier born at St. Louis, Mo., son of Gen. U. S. Grant. He studied at West Point, graduating in 1871. After serving for some time in the United States army and being advanced to the rank of lieutenant-colonel, he resigned in 1881, went to Austria as United States minister and was later commissioner of police in New York City. He served as brigadier-general of volunteers in the Spanish-American War, being in command at Porto Rico, and was transferred to the Philippines, where he again proved his efficiency. He was made a brigadier-general in the regular army in 1898, and has been commander of the departments of Texas, the Lakes and the East.

Grant, Robert (1852-), an American novelist and essayist, born in Boston. He graduated at Harvard in 1873, in 1876 received his Ph.D. and three years later completed a law course. In 1893 he became judge of the Probate Court and of the Court of Insolvency, for Suffolk County, Mass. He has written pleasing essays on social topics and a number of novels. *Unleavened Bread,* a powerful and popular novel, represents his best fiction. Other works are *The Carletons, An Average Man, The Knave of Hearts, The Undercurrent, The Lawbreakers, The Chippendales, Convictions of a Grandfather* and *The Art of Living.*

Grant, Ulysses Simpson (1822-1885), a celebrated American general and eighteenth president of the United States. He was born at Point Pleasant, Ohio, of Scotch ancestry, descended from Matthew Grant, who came to Dorchester, Mass., in 1630. His great-grandfather fought in the French and Indian War, as did his grandfather in the Revolutionary War.

EARLY LIFE. The oldest of six children, the boyhood of Ulysses was spent in helping his father on the farm in summer and attending the village school in winter. At the age of 17 he was appointed to the West Point Military Academy, where he made a creditable record and graduated in 1843. He was then commissioned as brevet second lieutenant and was stationed at Jefferson Barracks near St. Louis, Mo., going on in 1845 to Corpus Christi to join the army for the defense of Texas under Gen. Zachary Taylor. He served throughout the Mexican War, taking part in every important battle except Buena Vista, and was brevetted captain for gallant conduct. In 1848 he married Miss Julia Dent, sister of one of his classmates. During the

next five years he was stationed at various posts, including Detroit and Sackett's Harbor, and in 1852 went with his regiment to California from New York via the Isthmus of Panama. In 1854 he resigned his commission, after having attained the full rank of captain, and for the next six years engaged in farming and the real estate business near St. Louis. He then removed to Galena, Ill., and became a clerk in his father's hardware and leather store.

Civil War Period. When the Civil War broke out in 1861, it found him ready for service. He immediately recruited and drilled a company of volunteers which he marched to Springfield, where he became engaged in the adjutant-general's department as mustering officer. Receiving no reply to his letter offering his services to the National Government, he accepted appointment as colonel of the 21st Illinois Volunteer Infantry, becoming brigadier-general of volunteers in 1861. He seized Paducah at the mouth of the Tennessee River and Smithland at the mouth of the Cumberland; checked the advance of the Confederates at Fredericktown and Belmont; captured Ft. Henry (Feb. 6, 1862) and Ft. Donelson (Feb. 16), at the latter winning great popularity and the name "Unconditional Surrender Grant," and appointment as major-general of volunteers; was victorious in the two days' Battle of Shiloh (Apr. 6 and 7); and was second in command at the occupation of Corinth.

A few months later Grant was put in command of the Department of the Tennessee, which was enlarged to include part of Mississippi. After defeating the Confederates at Iuka he turned his attention to the reduction of Vicksburg. Failing to take the city by assault from the north, he ran his gunboats and transports down past the batteries, transported his army to the east bank of the river, cut loose from his base of supplies, marched rapidly against Johnston whom he defeated at Jackson, and drove the army of Pemberton into Vicksburg. After a siege of several weeks the city surrendered on July 4, 1863, with over 30,000 Confederate soldiers. The Mississippi was thus opened throughout its entire length, and the Confederacy was cut in two. Grant was made major-general in the regular army and placed in command of the military Division of the Tennessee.

In October he was made commander of the Division of the Mississippi, embracing the departments and armies of the Tennessee, the Cumberland and the Ohio. He at once proceeded to Chattanooga and took personal command of the Federal army there, which was besieged by the Confederates under Bragg, occupying strongly fortified positions on the heights about the city. Important outposts were carried on the 23rd, on the 24th the Federal army stormed Lookout Mountain, and on the 25th they carried Missionary Ridge in a remarkable charge. The Confederate army was completely routed and driven out of Tennessee. The grade of lieutenant-general was revived, and Grant was appointed to this position and made commander-in-chief of all the Federal armies, in March, 1864.

He now made his headquarters with the Army of the Potomac, and planned the simultaneous movement on the part of all the national armies which led to the overthrow of the Confederacy. Grant personally directed the operations against Lee in Virginia. In the series of terrific battles of the Wilderness, Spottsylvania, North Anna and Cold Harbor, fought with varying fortunes and great loss of life from May 5 to June 3, 1864, the enemy was gradually driven back towards Richmond, and Grant sent his famous dispatch to Washington: "I propose to fight it out on this line if it takes all summer." But it took longer than that. For a year Grant and his generals were engaged in almost constant fighting about Richmond; Sherman made his brilliant "march to the sea" and brought his forces up from the South; while Sheridan's cavalry drove Early out of Maryland and the Shenandoah Valley. Petersburg and Richmond became un-

tenable and were evacuated on the night of Apr. 2, 1865, and were occupied by Grant's forces the next morning. The retreating Confederates were pursued as far as Appomattox Courthouse, where Lee met Grant and surrendered his entire army. The surrender of Johnston to Sherman followed, and the war was practically over. Grant now made his headquarters in Washington, where he reorganized the army on a peace footing and bore an honorable part in measures for reconstruction. In 1866 Congress created the rank of general of the army and appointed him to that position.

PRESIDENT. Two years later Grant was nominated by the Republican Party for the presidency of the United States and was elected by a large majority. He was reelected for a second term in 1872. During his administrations the Alabama Claims were adjusted with England, the national debt was reduced, the Pacific railroads were completed, the Fifteenth Amendment to the Constitution was ratified and the disastrous financial panic of 1873 occurred. Serious financial scandals were uncovered among government officials, but in these Grant was in no way implicated unless in too zealously standing by friends who were guilty.

LATER YEARS. After completing his second term of office Grant made a tour around the world and was everywhere accorded extraordinary honors as a soldier and the foremost citizen of the United States. He later became connected with a banking firm which failed and involved him heavily in debt. Every mark of sympathy and confidence was given him, and Congress placed him on the retired list of the army as general, with full pay, a position he had resigned to become president. In the endeavor to repair his fortunes he undertook the writing of his *Memoirs*, a remarkably modest and impartial review of the Civil War. He was engaged upon this publication up to the very time of his death, which occurred from cancer on July 23, 1885. His remains were interred in a magnificent tomb in New York City overlooking the Hudson River.

ESTIMATE OF CHARACTER. General Grant was a plain and unassuming man, possessed of strong common sense, great self-reliance and invincible purpose. His reputation will rest upon his moral courage and military achievements. The history of progress in the Civil War is the story of Grant, as, unelated by victory and undaunted by defeat, he moved with the skill of a great commander from west to east, until his task was completed and the Union was saved.

Grape, a familiar fruit produced upon a woody, twining vine of the Vine Family. The plant is one of the oldest of domesticated fruit-bearers and has long been grown in the Old World for the production of wine and raisins. Grapes are grown in the most diverse localities, but the regions about the Mediterranean Sea are probably the best for wine grapes, and France and Spain lead in their production. In the United States wine grapes are grown on the Pacific slope and chiefly in California, conditions of climate and soil being there sufficiently like those of the Old World to permit the fruit to thrive.

The grapes grown throughout the United States are cultivated varieties of the vines once found wild in American woodlands. From them have been produced the Concord, the Worden, the Delaware, the Niagara, Moore's Early, the Brighton and other varieties familiar for table use. The regions fitted for raising these for commercial purposes are chiefly located near the larger lakes, where the water moderates the climate and prevents early frosts. The soil, too, should be light and not too rich in nitrogen, as its presence tends to increase the woody growth of the stem rather than the juiciness of the fruit. The Hudson Valley and the Great Lakes region are the chief grape-growing sections.

Since the grape is a rapid grower, severe pruning is necessary in order to limit the amount of wood. This should be done in the early spring, and the cuttings may be used for the propagation of new plants. Grafting is also practiced and proves very successful if done before

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FRUIT

1, 2, 9, 10. Currants
3, 4. Blackberries
5. Cranberry
6, 13, 21. Gooseberries
7, 8. Cherries
11, 12. Raspberries
14. Strawberries
15, 16. Plums
17. Apricot
18. Grapes
19. Peach
20. Apple
22. Pear

the sap rises in the spring. The vines must also be sprayed to prevent the growth of mildew, which is very disastrous to both leaves and fruit, and to destroy the insects that infest them. In European countries grapes are grown upon single frames and usually upon a southern slope, where the shadow of one plant will not fall upon its neighbor. In the United States, except in California, where the vines are pruned until

CLUSTER OF GRAPES

they resemble bushes, they are grown upon trellises, and the level land is found to be as advantageous as slopes.

California sends east thousands of carloads of grapes annually. These are preserved by prompt cooling and cold storage, a process which both the Australian and the United States governments have recently investigated and found to be eminently practical. Cleaned redwood sawdust is found to be the best packing for the grapes. Aside from their use for wine and raisins, grapes are now being extensively used for bottled, unfermented grape juice, a pleasant and healthful drink. The grape is the state emblem of Oregon. See WINE; RAISINS; PHYLLOXERA.

Grape'fruit", a tropical tree, or the fruit of the same tree, belonging to the Rue Family and resembling the orange and lemon in its manner of growth. It is a native of the East Indies but has been brought to the West Indies and to California and Florida. The tree attains a height of from 20 to 30 ft. and has large green leaves and bladed leafstalks. The flowers are broad and white. The fruit is somewhat larger than the orange and has a paler rind, within which is a tough, white lining surrounding the pulp. This pulp is divided into sections much like the orange except that they are less regular in form. The juice is sour and a little bitter, but with the use of sugar is very pleasing and is popular for desserts and preserves. The grapefruit tree is more tender than the orange and is not so easily grown in the United States. California, Florida and the West Indies supply the United States market and are endeavoring to produce sweet, juicy fruits. The ordinary grapefruit of commerce is globular and weighs from 4 to 14 lb. A pear-shaped variety is called the shaddock after a Captain Shaddock, who introduced the tree into the West Indies. The fruit derives its name from the fact that it grows in clusters, like grapes.

Grapeshot, a shot made by fastening together several balls. It usually consists of three layers of balls, with three balls in each layer, the layers being separated by disks of iron, with two additional disks, one above and the other below the layers of shot. A rod passes through the centers of the four disks, holding the whole shot together. The grapeshot was formerly very effective, but is now little used.

Graphite, *Graf' ite,* a mineral species consisting almost wholly of carbon,

which crystallizes in six-sided prisms. Chemically it is identical with the diamond, but the physical characteristics of the two are widely divergent. The diamond is the hardest of minerals, colorless and transparent, while graphite is soft, black and opaque; it is also greasy to the touch and oils everything with which it comes into contact. Some grades are granular in texture and have a highly metallic luster. Graphite occurs in the oldest rock formations, usually in masses or beds, sometimes in isolated scales. Although widely distributed, it is rarely found pure, but with an average of 50 per cent of other minerals. Large quantities are found in the Austrian Alps and in Ceylon, and extensive deposits of a fine grade are found in Canada and New York State. It occurs elsewhere in the United States and in Mexico, Siberia, Italy, England, Japan and Germany. The chief commercial uses of graphites are for crucibles, linings of portable furnaces, pencils, for electroplating, for protecting iron from rust and for reducing friction between parts of machinery. See PENCIL.

Graphophone, *Graf' o fone,* a machine for recording and reproducing sounds, invented by Charles S. Tainter and Chichester A. Bell. It is built on the same principle as the phonograph, but differs from that instrument in that its revolving cylinders, which register the sound vibrations, are wax-covered instead of being made entirely of that material. See PHONOGRAPH.

Grass, the name of a family of plants whose species are extremely useful to mankind. They are found all over the world and grow under the most varied conditions: on lawns and meadows, in swamps, woodlands and tropical forests.

In general the grasses are herbs, but they may be shrubs or trees. The flowers are inconspicuous, lacking calyx and corolla, but hanging in graceful, compound spikes, or spikes upon spikes. The structure of the flowers is very complex and cannot be taken up in detail. It is, however, an interesting fact that the stamen of the wheat flower is the most rapidly growing organ known. Its growth, which can be noted with the naked eye, has been known to be as rapid as 1.8 millimeter per second, or the rate of the movement of the minute hand of a watch.

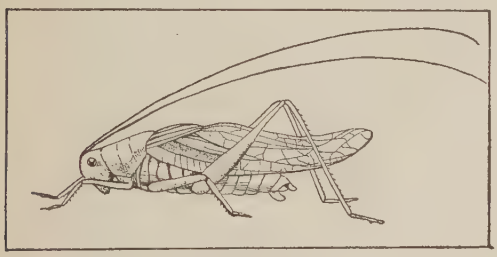
The leaves of the grasses are two-ranked; that is, each alternate leaf is on the opposite side of the stem from the one before it, the third being directly above the first, the fourth above the second, etc. The leaf stem is hollow and enclosed in an open sheath. Grasses may be distinguished from sedges, which they closely resemble, by means of these differences in leaves and stems, the leaves of the sedges being three-ranked and the stems solid. Many of the grasses have creeping, underground stems which send up leafy shoots. The roots are mostly perennial. Many species of grasses contain a great deal of silica, which serves to keep the stems brittle and the blades sharp and cutting.

The most common meadow grasses are timothy, Kentucky blue grass, rye grass, yellow oat grass, etc. The important cereal grasses are wheat, rye, barley, oats, maize and many fodder plants. These grow mostly in the temperate zones and are cultivated grasses. Rice and sugar cane are tropical cereals, and the bamboo is the typical tree grass.

Grasse, François Joseph Paul, MARQUIS DE GRASSE-TILLY, COUNT DE (1723-1788), the French admiral in command of the French fleet in the siege of Yorktown. He was born at Bar in Alpes Maritimes and early entered the French navy, where he became a captain and later the commander of a squadron. With a fleet of 29 ships manned with 3000 French sailors, he ably assisted Washington to force the surrender of Cornwallis in the last battles of the Revolutionary War. Later he sailed to the West Indies, where he met an English fleet under Rodney and was defeated in a desperate naval engagement. De Grasse was carried prisoner to England and charges of treason and inability were brought against him at home. Although the charges proved to be unfounded, De

Grasse was not returned to his command; after being released by the English, he spent his remaining years in Paris.

Grasshopper, a name applied to a number of species of two different families in the order Orthoptera. It is not definitely distinguished from the term *locust* in the United States, but is perhaps a little broader in its usage. It ordinarily refers to members of the Locustid Family, which, strangely enough, does not include the true locusts; the Acridiid, or True Locust, Family is the other group, having members spoken of as grasshoppers (See LOCUST). This discussion will concern itself only with members of the Locustid Family.



GRASSHOPPER

There are three well-known species, the sword bearer, the common meadow grasshopper and the lance-tailed grasshopper. All may be recognized by their short, peaked heads, long, slender antennæ reaching backward, as long as or longer than the body, and their delicate build. The meadow grasshopper is the one which leaps from the path before one on dusty midsummer days, startling one by its high leap and its sudden rasping call, or jumping from the uncut grass of the pasture, where its green color had effectually concealed it from view. Their music, without which the meadow and the roadside would be silent places, is produced by rasping together roughened portions of the forewings. The stridulating apparatus, as the roughened patches are called, is possessed only by the males, and in grasshoppers makes but a faint, soft sound heard by day as well as by night. This note has been likened to a prolonged *z r r r,* terminated by the repeated syllable *jip, jip, jip.*

The wings of all three species are long, but are not often used. The long, stout hind legs, whose knee joints are high above the back, are its chief aid in locomotion. The grasshopper deposits its eggs in the stems or leaves of grasses or in the pith of trees. Ordinarily grasshoppers are not serious pests because they are kept down by the numerous birds which prey upon them. When they do overrun the countryside, artificial means of destroying them must be resorted to. Some of these are discussed under the article on locusts.

Grav"ita'tion, the force which, acting at appreciable distances, attracts bodies toward each other. A small body and a large one exert this force toward each other equally, since each particle of one attracts each particle of the other. The nature of gravitation is unknown, but its force holds the planets in their orbits about the sun and causes bodies to fall toward the earth. Newton, who first studied gravitation, established the two facts concerning it: that at equal distances its force varies as the product of the masses of the attracting bodies; and that at unequal distances its force varies inversely as the square of the distance between the attracting bodies, center to center. For this reason, eliminating centrifugal force, which acts most strongly at the equator, the same body would weigh less at the equator than at the poles, which are nearer the center of the earth than the equator is. The constant of gravitation is the force with which two spherical bodies, each of unit mass whose centers are unit distance apart, attract each other. The force is .0000000666 dyne for two bodies of one gram each, whose centers are one centimeter apart. The laws of gravitation of the earth, or gravity, are discussed under the title FALLING BODIES.

Grav'ity, Center of, a point upon which a body may be balanced. It is the point through which passes, whatever the position of the body, the resultant of the parallel forces of gravity acting upon all particles of the body. In regular plane and solid figures the center of

gravity is the same as the center of the figure. The center of gravity of an irregular plane figure may be found by suspending it first from one corner and then from another and in each case dropping a plumb line from the vertex used; if lines are drawn in the position taken by the plumb line in its successive positions, the center of gravity will lie at the intersection of these lines. If pinned to the wall at that point, the figures will remain at rest in any position. The center of gravity of a solid can be found in the same manner as that of a plane figure, by suspending the solid from each of two different points in turn and noting the intersection of the plumb lines from the two points respectively. For some bodies the center of gravity lies wholly outside the body.

Gravity, Specific, the density of a substance compared with that of a fixed standard. For solids and liquids the standard is water; for gases it may be either water or air. The terms *density* and *specific gravity* should be carefully distinguished. The density of a substance is its weight (more properly, its mass) per unit volume; the density of cast iron is 462.5 lb. per cubic foot, while the density of water is 62.5 lb. per cubic foot. The specific gravity of iron is the ratio of these two densities, $\frac{462.5}{62.5}$, which equals 7.4. In the metric system the density of iron is 7.4 grams per cubic centimeter, while that of water is one gram per cubic centimeter. In the metric system the numerical values of the density and the specific gravity of a substance are the same, since the density of water is one gram per cubic centimeter at the temperature of 4° C.; the density of water is slightly less at lower temperatures and decreases with rise in temperature, being only .9586 gram per cubic centimeter at 100° C.

The fundamental method of determining the specific gravity of a substance is to find the weight of the substance and the weight of an equal volume of water; then divide the first weight by the second. When a solid is placed in a liquid, the solid loses in weight an amount equal to the weight of the liquid displaced by the solid; that is, its loss in weight is the weight of an equal volume of the liquid. Because of this, to find the specific gravity of a solid heavier than water, the solid is weighed first in air and then in water, and the weight in air is divided by the difference between the two weights. If a solid is lighter than water, a sinker can be used. The solid and the sinker are weighed separately in air, the sinker is weighed alone in water, and then the sinker and the solid are weighed in water. If from the loss of weight of both, the loss of weight of the sinker is subtracted, the result will be the loss of weight of the solid alone. Then the weight of the solid in air divided by its loss of weight in water gives its specific gravity.

The specific gravity of a liquid is usually found by means of a "specific gravity bottle," a light glass bottle with a glass stopper, so arranged that the bottle can be easily filled just to the top of a small hole in the stopper. The bottle is weighed first empty, then when filled with water. The difference in weight of the bottle full of the liquid and empty divided by the difference in weight of the bottle full of water and empty gives the specific gravity of the liquid. The specific gravity of liquids is very conveniently found directly by means of a variable immersion hydrometer. See HYDROMETER.

In all the above work corrections should be made for the density of the water used, if it is not distilled water at 4° C., when very accurate results are required.

The specific gravity of gas is found by weighing a light glass bulb filled with the gas and then exhausting the bulb with an air pump and weighing again; the difference is the weight of this volume of gas. The weight of the gas divided by the weight of the same volume of air obtained in like manner gives the specific gravity of the gas. Since the specific gravity of a gas depends upon its temperature and pressure, it is necessary to see that the gas and the air are at the same temperature and pressure in carry-

ing out the above determination. If they are not used under the same conditions, corrections must be applied according to the laws of gases; air at 0° C. and under a pressure of 76 centimeters of mercury is taken as a standard, its density then being .001293 gram per cubic centimeter. See GASES, LAWS OF.

Gray, Asa (1810-1888), an eminent American scientist, whose works on botany are authority in the United States. He was a graduate of Fairfield Medical College, but owing to his love for botanical study gave up the practice of medicine for work in natural history. He became professor of natural history in Harvard University and was there a voluminous writer on botanical subjects. Living as he did, at a time when botanical classifications were undergoing a change from the artificial to the natural system, and when the newer portions of his country were being explored and settled, Gray found wide field for his labor in the study and classification of American flora. His investigations and their results are recorded in his many books and papers; his *School and Field Botany* was long a popular school text and his *Flora* is still widely used.

Gray, Elisha (1835-1901), an American inventor, born in Barnesville, Ohio. He took up special studies in physical science at Oberlin, and in 1867 invented a self-adjusting telegraph relay. In 1872 he organized the Western Electric Manufacturing Company, and four years later claimed to have invented the speaking telephone. After a memorable litigation, however, this honor was awarded Alexander Graham Bell. Later Gray perfected and patented various telegraph instruments and details of telegraphic construction, including a system of multiplex telegraphy, a type-printing telegraph and in 1893 the telautograph, which transmits the handwriting of messages. See TELEGRAPH; TELAUTOGRAPH.

Gray, George (1840-), an American jurist, born in New Castle, Del., and educated at Princeton and Harvard. Admitted to the bar, he practiced at New Castle and Wilmington, being attorney-general of Delaware and, from 1885 to 1899, serving as a Democratic United States senator. Meanwhile, he was appointed to the Anglo-American Commission, the Spanish-American Peace Commission and the Joint High Commission between Canada and the United States. In 1900 he belonged to the Hague Arbitration Commission, and in 1902 to the anthracite coal strike commission. In 1899 he became judge of the United States Circuit Court.

Gray, Thomas (1716-1771), an English poet, born in London. He studied at Eton and Cambridge, but before taking his degree in civil law accompanied Horace Walpole on a tour through France and Italy. He declined the honor of being poet laureate of England and in 1768 became professor of modern history in Cambridge. His fame rests chiefly on the *Elegy Written in a Country Churchyard,* a marvel of simplicity and classical finish. His theme, the compensations of lowly life, was comparatively new, and reveals his sympathy with the early beginnings of Romanticism. His interest in Norse mythology and literature likewise indicates his revolt from Classicism and gave rise to the odes, *The Fatal Sisters, The Descent of Odin* and *The Triumphs of Owen.* Other poems were *Ode on a Distant Prospect of Eton College, The Progress of Poesy* and *The Bard.* See ROMANTICISM.

Gray'ling, an exceedingly active fish of the Salmon Family, found in cool streams of temperate regions or colder Arctic zones. Its body is long and only slightly elevated at the back, but a high dorsal fin gives it the appearance of width. The head of the grayling is short, the mouth small and the eyes very prominent. The Michigan, Montana and Arctic graylings are all good game fishes, much sought by American fishermen and propagated at many government fish hatcheries. They are about 18 inches in length and of blue-gray color.

Great Australian Bight, *Bite,* a great bay at the south of Australia made by a broad indentation of the shore and forming an arm of the Antarctic Ocean. Its

shores are irregular, with smaller bays and numerous capes and peninsulas projecting into its waters. The Murray and the Darling rivers flow into this great bay, but no large cities are upon its banks. See AUSTRALIA, subhead *Coast Waters.*

Great Bear (Ursa Major), one of the constellations about the North Star. It contains 138 stars visible to the naked eye, but is popularly known by seven stars and called the Big Dipper. The two stars of the second magnitude forming the outer end of the bowl of the Dipper are very nearly in line with the North Star, and for this reason are called the pointers. In England this constellation is called Charles's Wain (wagon). See STARS; CONSTELLATIONS.

Great Bear Lake, a lake situated in northwestern North West Territories, Canada, 250 m. from the Rocky Mountains and just beneath the Arctic Circle and the constellation of Ursa Major, from which it derives its name. It is about 150 m. long and from 25 m. to 45 m. wide, but its coast line is very irregular. The lake receives the drainage from a large area and is fed by the Dease and other rivers; the Great Bear River is the outlet. The surface is frozen over nine months of the year.

Great Britain, the largest island of Europe, comprising England, Scotland and Wales. The name British Isles applies to this same territory with the addition of Ireland, the Hebrides, the Orkneys, the Isle of Man, Jersey, Guernsey and other groups of islands lying near. The official title is the United Kingdom of Great Britain and Ireland, while the British Empire refers to all of the territory under the authority of the British Crown. The numerous possessions included in this great empire, embracing all climes and containing one-fourth of the population of the world, are listed at the close of this article. For detailed descriptions, see ENGLAND; SCOTLAND; IRELAND; WALES.

The Island of Britain, or Great Britain, has an irregular coast line indented by many bays, estuaries and firths. Its principal boundaries are: on the n., the Atlantic Ocean; on the e., the North Sea and the Straits of Dover; on the s., the English Channel, separating England from France; and on the w., St. George's Channel and the Irish Sea, separating England from Ireland, and the Atlantic Ocean at the extreme northwest. Its area is 88,729 sq. m., or slightly greater than the State of Utah. Its greatest length is 608 m. and its greatest width is 320 m., the latter being from Land's End in the southwestern part to Kent in the southeastern. Its latitude is the same as that of North America from the Gulf of St. Lawrence to the southern extremity of Greenland, though its temperature generally corresponds to that of the United States.

PHYSICAL CHARACTERISTICS. At the west and northwest a series of irregular mountain systems reach almost to the coast and spread to the east in somewhat disconnected groups. The Cambrian Mountains of Wales, the Cheviots, forming a part of the boundary of England and Scotland, and the Grampians in Scotland are among the best known. The highest point of the island is Ben Nevis (4406 ft.), a peak of the Grampians near the western coast of Scotland. The loftiest elevation in Wales is Mt. Snowdon (3560 ft.), and in England, Mt. Scafell (3210 ft.), not far from the Scottish border. The central and southern part of Great Britain is a region of rounding hills clothed with verdure and intersected by many rivers; at the west these hills rise to the mountains; at the east they slope to an alluvial plain. The rivers, lakes and other physiographic features are described in greater detail under the titles of the separate political divisions.

CLIMATE, PRODUCTIONS, INDUSTRIES, ETC. The climate is variable but healthful. The Gulf Stream, washing the western shores, moderates the temperature, making the winters less rigorous than in European countries of the same latitude. The island has supported so large a population that agriculture has become highly developed. Fruits, grains

and vegetables of temperate climates are produced, and cattle of all kinds are extensively raised. The native wild animals are the fox, badger, wildcat, marten, rabbit, hare, otter and deer; these take the place of the bear, boar, wolf and beaver, once common but now almost wholly exterminated. The mineral productions, especially tin, iron, copper, silver, gold and coal, are valuable; of the latter, England mines annually fully 153,000,000 tons; Scotland, 32,800,000 tons; and Wales, 32,600,000 tons. Manufacturing is among the important industries because of the excellent water power and the wealth of iron and coal. Of these the manufacture of textiles is first in rank, and its exports constitute more than one-third of the exports of the United Kingdom.

GOVERNMENT. Politically Great Britain is a limited monarchy whose great possessions are united under the name of British Empire, consisting of two parts: the United Kingdom of Great Britain and Ireland; and India, the colonies, the protectorates and the dependencies. The constitution is not one written instrument but is a vast collection of acts, some unwritten, which have grown with the years and form the great body of English laws. It consists of ten kinds of documents: the laws of Parliament, royal decrees, agreements, treaties, legal decisions, the Magna Charta, granted by King John in 1215, the Declaration of Rights of 1689, the Act of Settlement of 1701 and the two Acts of Union, one with Scotland in 1707 and one with Ireland in 1800.

The central government is made up of three departments. The executive is a king whose office comes to him through descent. Although the king is the nominal executive, the cabinet, a committee of ministers, is the real authority; the ministry, however, depends for its existence upon the possession of a majority of the House of Commons. The first lord of the treasury is generally the head of the cabinet and is then known as the prime minister. The other members of the cabinet, 18 or 20 in number, are

GREAT BRITAIN

appointed by the Crown upon the advice of the prime minister, who has been previously chosen by the Crown from the majority of the House. The legislative department consists of a House of Lords and a House of Commons. Members of the former are peers of the realm who hold their places by hereditary right; by creation of the king; by virtue of office, as bishop; by election for life, as the Irish peers; by election during Parliament, as Scottish peers. The full house is about 630. The members of the House of Commons are representatives of the counties, boroughs, and university constituencies. Clergymen are disqualified from holding seats, and sheriffs and government contractors can neither hold seats nor vote. The annual session of Parliament extends from the middle of February to about the middle of August and is summoned by writ of the sovereign issued 35 days before the date of assembling. It is closed by prorogation, and all bills which have not passed during the session lapse. The longest Parliament of recent years was the sixth of Victoria's reign; it lasted for six years and one month. The limit of existence of Parliament now is five years.

The local governments differ in the different large divisions. In each county of England and Wales a lord lieutenant represents the Crown. Scotland has a local government board whose president is called the secretary of Scotland. The county authority of Ireland is a council elected by popular vote. The other dependencies are of three principal kinds: crown colonies, wholly controlled by the home government, as India, Gibraltar, the Straits Settlements, etc.; those possessing responsible governments in which the sovereign appoints the governor and has the right of veto on legislation, but otherwise has no control on any public officer, represented by Canada, Australia, South Africa and New Zealand; and those possessing representative institutions in which the Crown may veto legislation and in which the home government controls public officers, represented by Malta, Ceylon, Cyprus, Jamaica, etc.

Aside from these may be mentioned the protectorates, which are governed by native agencies, and the old trading companies, whose rights were granted by charter.

History. After the accession of James I in 1603 (See England, subhead *History*) England and Scotland had the same sovereigns, but the legislatures were not joined until the Act of Union (1707) was passed during the reign of Queen Anne. Although the union was not unanimously approved, it seemed the only certain way of preserving peace between the two countries. Peace at home and abroad became the desire of the Tory Party, which was then in ascendancy. In literature this age ranks as the age of prose writers, among whom may be mentioned Addison, Swift, Steele, Berkeley and Locke. Anne was succeeded by George I (1714-1727), the first of the Hanover line, during whose reign the peculiar and efficient cabinet government of England began. Robert Walpole, whose aid had kept the country from bankruptcy upon the bursting of the South Sea Bubble, was the first prime minister (See South Sea Company). Through his skill and the efficiency of the ministers which he chose, England enjoyed great prosperity through the last years of the reign of this ruler who was himself unable to speak a word of English.

George II (1727-1760) succeeded his father and followed his policy of noninterference and indifference in English affairs. Walpole, who continued prime minister, was unwillingly drawn into a war with Spain in 1739, and later, in 1742, resigned rather than assume the responsibility of the War of the Austrian Succession, in which, under the ministry of Lord Carteret, England won a fruitless victory. A rising in Scotland under Charles Edward, the Young Pretender, was crushed at Culloden, and the leader was compelled to flee (See Charles Edward). William Pitt, who had been a young statesman of oratorical fame in the days of Walpole, became head of the cabinet and, during absences of the king, the virtual ruler of Great Britain; he prosecuted the war with France with great vigor and through his plans England gained important victories in America and India. See Pitt, William; Clive, Robert; Wolfe, James.

George III (1760-1820) was English in training, upright, conscientious and ambitious, and he determined to regain the royal powers lost by his father and grandfather. But he was also narrow and bigoted. Pitt resigned in 1761 and was followed by the King's favorite, Bute, and, later still, by North. Under North the dissatisfaction of the American colonies reached a crisis and their independence from Great Britain was declared and won (See Revolutionary War in America). This forced North's resignation, and his place as prime minister was taken by the younger Pitt, who remained in office until his death in 1806; he maintained a constant opposition to the French Revolution and to Napoleon. Nelson's great naval victory over the French at Trafalgar and Wellington's defeat of Napoleon at Waterloo made England dominant upon the sea and led to favorable terms for England at the subsequent Congress of Vienna. See Nelson, Horatio; Wellington, Arthur Wellesley.

The French wars, an insurrection in Ireland and a second war with the United States (See War of 1812) had piled up an enormous national debt. When George IV (1820-1830) became king the discontent and distress led to demands for reform, which were begun under Canning, and under Wellington, who succeeded him, were still further carried out. The Test Act against the Catholics was repealed in 1828, and Catholics were henceforth admitted to municipal privileges, to corporate offices and even to Parliament. William IV (1830-1837) created the requisite number of peers to pass the Reform Bill of 1832, which completely reorganized the representation in Parliament, and in 1833 slavery was abolished in the colonies.

Queen Victoria (1837-1901) ruled the

empire for nearly 64 years, making her reign the longest in history, with one exception. She greatly endeared the monarchy to the people, and during her long reign strengthened the relations of the colonies to the central government. British power was extended and strengthened in India, the Confederation of Canadian Provinces was formed in 1867 and the Commonwealth of Australia in 1900. These were among the most important civic events of the century. The Crimean War occurred in 1853-6, and the Boer War in 1899-1902, which resulted in adding the Orange River Republic of Transvaal to the British Empire. The most important measures within the United Kingdom were the repeal of the Corn Laws, the extension of the franchise.

THE WAR OF 1914. Signs of a coming struggle were apparent before the close of Victoria's long reign. When the devastating war broke out, George V, son and successor of Edward VII, and grandson of Victoria, was on the throne. For years, it had been an open secret that Germany planned a crushing blow at Great Britain and it was generally held that the Bagdad Railway project was a great step in preparation for that result. A treaty between Great Britain and Germany in 1914 (but not signed) would have prevented the World War.

England was one of the powers guaranteeing the independence of Belgium and could not stand idly by when Germany invaded Belgium in August, 1914. England was not bound by treaty to come to the assistance of France, but every consideration of national honor and national safety impelled to such a course.

In the fierce furnace fires of the conflict the old British Empire and the old order of life in England disappears and a new empire emerges.

The great self-governing colonies of the empire are bound together by new ties of loyalty and devotion to new democratic ideals of government. Changes going to the warp and woof of English political life have been effected, and a new England will result.

BRITISH EMPIRE

United Kingdom, Great Britain, Ireland.

Europe, Gibraltar, Malta.

Asia, Aden, India, Straits Settlements, Malay States, Hongkong, Wei-hai-wei, Cyprus, Perim, Sokotra, British Borneo, Sarawak.

Pacific, Australian Commonwealth, Papua, New Zealand, Fiji, Tonga Islands, Solomon Islands, Gilbert Islands.

Africa, Egypt and Lybian Desert, Anglo-Egyptian Sudan, Uganda, East Africa Protectorate, Union of South Africa, Nigeria, Gold Coast, Sierra Leone, and Gambia; Ascension, St. Helena, Zanzibar, Seychelles, Mauritius.

Under Mandate Rule, Former German Island in the Pacific south of the equator, German East Africa, German Southwest Africa, and Turkish Provinces in Mesopotamia.

America, Canada, Newfoundland and Labrador, British Honduras, British Guiana, Bermuda, Bahamas, Turks and Caicos Islands, Jamaica, Windward Islands, Leeward Islands, Trinidad and Tobago, Falkland Islands.

Great Falls, Mont., the second city of the state and the county seat of Cascade Co., situated in the north-central part of the State, on the Missouri River and on the Great Northern, the Chicago, Milwaukee & St. Paul and other railroads. It lies in a level valley surrounded by the foothills of the Rockies, whose snow-capped peaks are visible to the west, and is ten miles above the Great Falls of the river, from which the city derives its name.

STREETS, BOULEVARDS AND PARKS. Great Falls has been well laid out, for the streets, with the exception of two which follow the course of the river, cross each other at right angles. A strip of lawn ten feet wide on each side of the walk lines all of the streets and is set out to trees; thus, though the region was originally treeless, Great Falls is a well-shaded city. The most of the streets are paved, and a broad boulevard, Valeria

Way, encircling the city, furnishes an attractive drive and automobile speedway. The extensive park system includes Black Eagle Park, Gibson Park and Whittier Park, aside from large park reservations to be used as the growth of the city demands. The city maintains a nursery, which keeps the parks and boulevards supplied with trees and shrubs.

Public Buildings. The well-kept public grounds of the city have inspired the people to give especial attention to their private grounds and homes, and Great Falls is thus an unusually attractive home city. Aside from its pleasant residences, there are many public buildings of importance, including a modern courthouse, the Federal Building, a Carnegie library, several beautiful churches and the Rainbow Hotel, one of the finest of the Middle West.

Educational Institutions. The school system maintains grade schools and a high school in modern, well-equipped buildings. St. Ursula's Academy for girls is a recently-established higher institution.

Industries. Great Falls is in the midst of a great mining region, and its great copper smelter, one of the largest in the world and having the highest stack, is the center of the industrial activity of the city. Next to Anaconda the product of the Great Falls smelter is the largest in the state. Coal and silver mining are carried on in the vicinity, and the fine grazing lands in the valley about the city render it an important shipping point for live stock. The water power from the river is unsurpassed and is sufficient, it is estimated, to furnish power to every city of Montana. Power generated by Rainbow Falls, with the Great Rainbow Dam, is used to run the city's electric railway and lighting plant, as well as those of Butte and Cascade. This power is also used for other manufacturing plants, which, though important, are largely overshadowed by the city's one great industry. Black Eagle Falls above Rainbow Falls, and Great Falls below them, both furnish immense possibilities for water power.

History. Great Falls was settled in 1884 and owes its location to the industrial value of the situation. Its growth was rapid and it became a city in 1888. Population in 1910, 13,948; in 1920, U. S. Census, 24,121.

Great Falls of the Yellowstone. See Yellowstone National Park.

Great Kanawha, *Ka naw' wah,* a river of eastern United States. It rises in the Blue Ridge Mountains in North Carolina and first flows northeast through Virgina, then turns to the northwest and crosses the west-central counties of West Virginia. It enters the Ohio, of which it is an important tributary, near the city of Point Pleasant. Its entire length is about 450 m., but it is navigable for only a little more than 100 m., because of the Kanawha Falls not far from its juncture with the Gauley. The cities of Charleston, Montgomery and Hinton lie upon its banks.

Great Lakes, the name given to the five large lakes that lie in northern United States and form a part of the boundary between it and Canada. Through the St. Lawrence River their waters reach the Atlantic, and thus with their connecting rivers, straits and smaller lakes they are a part of the great St. Lawrence basin. Together these lakes have an area of 94,650 sq. m., practically the same as that of Oregon and greater than the combined areas of New York and Pennsylvania. They cover a greater area than the Island of Great Britain and are about one-half as large as France.

Lake Superior, the largest, is also the farthest north. It is 390 m. long and 160 m. wide and alone is larger than the entire State of South Carolina. By means of St. Mary's River it connects with Lake Huron, the second of the lakes in size. This lake is a little smaller than West Virginia and has a large arm known as Georgian Bay. Through the Straits of Mackinaw the waters of Lake Michigan join those of Lake Huron at the northwest. Lake Michigan has about the same area as Vermont, Massachusetts, Connecticut and Rhode Island.

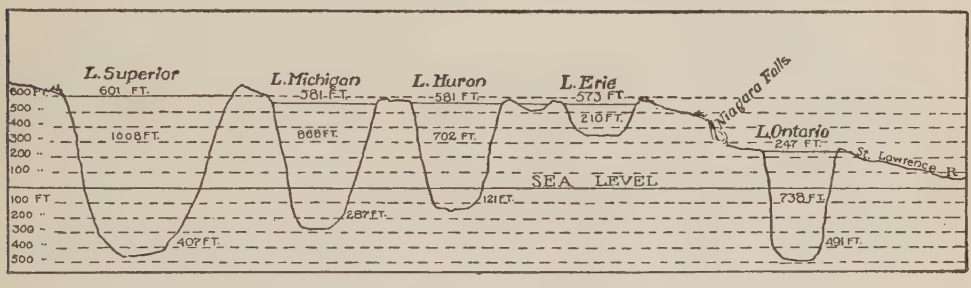
South from Lake Huron the waters flow through the St. Clair River, beautiful Lake St. Clair and the broad Detroit River into Lake Erie. This lake is shallow and subject to sudden storms. It is slightly larger than Vermont. The Niagara River, with its famous falls and rapids, carries the great stream on to Lake Ontario, the smallest lake of the five. Its area is greater than that of Connecticut and Rhode Island, and at its eastern extremity it narrows to the bed of the St. Lawrence.

The great traffic in grain, lumber, iron ore, coal, copper, flour and other freight carried on by means of these lakes renders this one of the greatest waterways of the world. Lighthouses mark the dangercus reefs and rocky coasts, and channels have been widened and deepened to make passageway for the largest boats. The great locks at the "Soo," the ship canal across Keweenaw Peninsula in northern Michigan, and the Welland Canal around Niagara Falls are among the engineering feats that have rendered this highway complete.

The first vessel other than a canoe to be sailed upon the Great Lakes was the *Griffon,* constructed by La Salle in 1679. Later, in 1818, the first steamer, *Walk-in-the-Water,* was launched on Lake Erie. The first steamer reached the Soo in 1827, and the first came to Chicago in 1832. Today the great passenger and freight boats are as well equipped and as convenient as ocean-going boats, and carry an average of 16,000,000 passengers annually and fully 83,000,000 tons of freight. See Superior, Lake; Michigan, Lake; Huron, Lake; Erie, Lake; Ontario, Lake; Sault Ste. Marie Canals; Welland Canal.

Great Northern Diver. See Loon.

Great Salt Lake, a lake of Utah, lying in the northeast part of the Great Basin. It is now 75 m. long and from 20 to 35 m. in breadth, but is the remains of a far larger lake, called by geologists Lake Bonneville, the surface of which was fully 1000 ft. above that of the present lake. It has an average depth of 60 ft., and upon its surface lie two islands, Fremont and Antelope, and a long peninsula, called the Promontory, entering it from the north. The lake is crossed from east to west by the "Lucin Cut-off"



ALTITUDE AND DEPTH OF THE GREAT LAKES

of the Southern Pacific Railway. The lake has no outlet and is fed chiefly by three rivers, the Bear, the Jordan and the Weber, all of which enter from the east. The water is so heavy with solid matter, principally salt, that a person bathing cannot sink, being lighter than the water. The amount of salt in the water varies as the lake rises and falls with the change of seasons.

The lake is of interest because of its picturesque surroundings, its popularity as a bathing resort and its geological and commercial importance. Garfield and Saltair lie upon its southern shore and have excellent pavilions and bathhouses. Commercially, the lake is an important source of salt. The brine is pumped through long conduits to ponds, where it is evaporated by the sun. The salt is then purified. Great Salt Lake was not

much known until the Mormon settlement was made near it in 1847. Since then extensive geological surveys have been made of the lake and its vicinity.

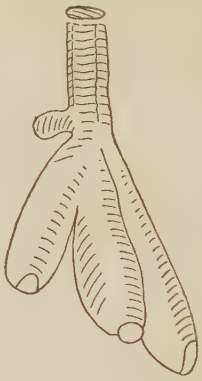
Great Slave Lake, a lake situated in North West Territories, Canada, s.e. of Great Bear Lake, is about 300 m. long and about 50 m. wide, but the shores are very irregular and deeply indented with large bays. It is fed by the Slave, Hay, Yellow Knife and smaller rivers and the Mackenzie River forms the outlet into the Arctic Ocean. The shores are steep and rugged and the lake contains several islands. The water is very clear but is frozen over six months of the year and is open to navigation only from July to October.

Great Wall of China, an extensive wall or fortification of China originally built to bar out the invading tribes of the north. Its eastern extremity was probably at Shanhaikwan on the Gulf of Liaotung, although much of the eastern portion has been destroyed. From here it extended west and southwest to Peking and along the northern boundaries of the Chinese provinces. Two branches of the wall extend south, affording double protection. With its windings the extent of the wall is 1500 m., making it the longest artificial structure in the world. It is built generally of boulders and earth, although in the valleys brickwork and hewn stone show traces of better masonry. At the base the wall is from 20 to 25 ft. wide; at the summit it is about 12 ft.; its height is from 20 to 30 ft.; and every two hundred yards there are square towers 40 ft. in height. In many places in the mountains the wall is 4000 ft. above sea level.

The wall was begun probably about the third century B. C. and was repaired in the 15th century A. D.; a year later it was extended 300 m. Although much of the wall has been destroyed or buried, military posts are still maintained at many of the city gates. The labor expended in building the wall was probably much less than was formerly supposed, since little of the work was that of skilled masons.

Grebe, or **Diver,** a diving bird related to the loons and auks. They have heavy bodies, short legs, the toes only partly webbed, and short wings. Like the loons, the grebes are almost helpless on land.

EARED GREBE. This is one of the best-known grebes of western North America. It is about 14 inches long; the back is blackish; the sides, brown; head, chest and neck, black; and breast, silvery white. Each side of the head is provided with a long tuft of yellow, silky feathers. Like some other grebes, the nest of the eared grebe is made of rushes, floats on the water and contains from four to six dirty-white eggs. The young are downy and black. This beautiful bird is being rapidly exterminated. Its silvery breast and brown flanks are highly prized by fashion's devotees, and whole colonies are destroyed in the breeding season when the parents are caring for the young; for, when the parents are killed, the helpless offspring are allowed to die of starvation and exposure.



FOOT OF GREBE

Greece, a kingdom of Europe occupying the southern extremity of the Balkan Peninsula. It is bounded on the n. by Albania, Servia and Bulgaria, on the e. by the Ægean Sea, on the s. by the Mediterranean, which separates it from Africa, and on the w. by the Ionian Sea. The numerous islands that lie in the Ionian and Ægean seas belong to the Kingdom of Greece and are inseparably connected with it through historical association. The continental portion is made of two parts—Hellas, at the north, and Morea, formerly called Peloponnesus, at the south; these divisions are almost wholly separated by the great gulfs of Patras and Lepanto, or Corinth, that deeply indent the country on the west, and by the broad Gulf of Ægina,

indenting it on the east. The narrow Isthmus of Corinth connecting the two is barely four miles across and is traversed by a ship canal completed in 1893. The area of Greece and her islands is 46,000 sq. m., about the same as that of Mississippi.

Physical Characteristics. Greece is a mountainous country. The western portion of Hellas is traversed by the Dinaric Alps, isolated peaks of which form the Ionian Islands; the range continues through Morea, where it rises in many lofty summits. The Pindus Range enters from Turkey and, running north and south, divides Morea into two nearly equal parts. One branch of the Pindus forms the southern boundary of Thessaly, and another, farther south, culminates in Mt. Parnassus (8070 ft.), now known as Mt. Liakoura, once dedicated to Bacchus and to the Muses. The rocky character of the country has given Greece an extended coast line, greater in proportion to its size than that of any other country, and the same physical features appear in its isolated islands. The rivers are rapid mountain torrents of great beauty, but generally of little use for navigation. The climate is ordinarily healthful, although in the lower sections the summers are hot and dry and vegetation can seldom resist the drought of the warm months.

Products, Industries, Etc. Greece is a land of fruits and vines. Along the coast great vineyards climb the slopes and, wherever the elevation permits, groves of olives, figs, oranges, citrons and pomegranates are cultivated even to the very limits of the cities. Melons, rice, wheat, barley, rye and cotton also form important crops, but agriculture is not a profitable occupation, and only about 14 per cent of the land is under cultivation. Currants, fruit whose name is derived from the word Corinth, are exported in large quantities, and acorns used in tanning are picked up and shipped by the thousands of tons annually.

Minerals, though undoubtedly existing in abundance, are not extensively mined, yet many of the mines have been worked since earliest times. Silver, manganese, cadmium, iron and lead are known to exist and are mined to some extent. Sulphur is taken from many of the volcanic islands and the marbles of Naxos and Paphos have long been famed. The manufactured articles are made chiefly for home consumption and consist of silks, cottons, woolens, pottery, sugar, soaps, leather and paper. Maritime commerce has always been one of the great industries; Athens with Piræus, Patras, Hydra, Nauplia, Hermoupolis and Kalamata are the chief ports.

Ancient Greece. The ancient Greeks called their country Hellas and they spoke of themselves as Hellenes. In the beginning the more important centers of Greek civilization were not alone in the peninsula but in the islands and coasts of the Ægean Sea, while Greek colonies were planted on the shores of the Black Sea, in Sicily and in Italy and other parts of the Mediterranean region. Greece proper was favored by nature in respect to position, physical characteristics and climate. Its separation from the east by the narrow Hellespont and the Ægean Sea saved it from falling under the numbing despotism of the older countries, while its proximity to these older civilizations enabled it to profit by their progress. The islands scattered over the Ægean early led to commerce, and through commerce to the learning of the East. Moreover, nearly all of the people shared in the civilizing influence of the sea, for only two states, unprogressive and unimportant, were without coast line. Thus early in their history we find the Greeks having the progressive and venturesome cast natural to a nation of traders and sailors.

Religion. The religion of the Greeks was based on ancestor worship, the worship of a local deity, and upon a nature worship. Like the Oriental, the Greek believed that the world was peopled by spirits who interested themselves in his daily life and influenced it. All the forces of nature revealed the presence of these beings, from the sprouting of the spear of wheat to the voice of thun-

der in the sky. These spirits had the desires and passions of human beings, but on a larger scale. They represented their gods under the forms of the highest human beauty and thus escaped the debasing tendency of the animal form of worship of the people of the East. Moreover, they systematized or organized their gods into a family of whom the chief dwelt upon the top of cloud-capped Olympus. This religion was, however, largely for the present life. The dead dwelt in a dark underground region called Hades, so gloomy that Achilles expressed the national belief when he said, "Rather would I live upon the earth as the hireling of another, with a landless man who had no great livelihood, than bear sway among the dead that be departed."

Olympian Games. These games were held at Olympia, Elis, every four years in honor of Zeus; they constituted the most largely attended festival, and men from all parts of Hellas flocked thither. At first the contests consisted of foot and chariot racing, wrestling and boxing. The highest honor open to any Greek was to receive the olive wreath as victor at Olympia. See OLYMPIAN GAMES.

Oracles. An oracle among the ancients was the seat of worship of some god where he announced his prophecies to those consulting him. Sometimes the prophecies were made known through priests and priestesses and sometimes they were intimated by signs. People came from near and far to consult these oracles in regard to matters of public and private interest, from the conclusion of a treaty to a new venture in business. The most famous Greek oracle was that of Apollo at Delphi, a town in Phocis. Here a priestess named Pythia, after the Python slain by Apollo, sat on a tripod and delivered the message of the god. To the uninitiated the utterings of the priestess were unintelligible, but these were interpreted to the inquirer by the priests of Apollo. In historical times the Delphic oracle often gave evasive answers and also seemed to be swayed by party faction. The Greeks had 22 oracles for the consultation of Apollo. Zeus was also considered a god of prophecy and he was consulted in the shade of Dodona in Epirus, where the divine will was revealed by the rustling of the oak leaves of the forest. These oracles were consulted until the time of Theodosius (379-395), who closed the temples.

Amphictyonic Council. This was a league of ancient Greek cities centering in a shrine. Among the most famous was the association formed to protect the temple at Delphi. Later smaller leagues arose for the protection of other temples in Greece. They were the earliest suggestion of a sense of unity among the Greek states. The name *Amphictyonic* signifies "dwellers-round-about."

Literature. See LITERATURE, subhead *Greek Literature.*

HISTORY. *Mycenæan Age.* (? -1000 B. C.). The beginnings of Greece are lost in obscurity, and the first period, called the Mycenæan Age, reaches from this obscure past to about 1000 B. C. We dimly see by the ruins, for they left no written records, the outlines of states on the coasts of the Ægean, with kings, rich and powerful, ruling over wide territories and making alliances with the people about them. That they had commercial relations with distant nations is proved by the Mycenæan pottery found in Egypt, while Mycenæan soldiers are pictured on the walls of Egyptian temples built in the 19th and 20th dynasties. In the *Odyssey* the extent of sea known by them is revealed, for this poem, though it was written in the age that followed, depicts the glory and tells the traditions of the Mycenæan Age.

Middle Age (1000-500 B. C.). The Mycenæan period was brought to a close by the invading Dorians, a rude people who poured into Greece from the northwest. In the process of the next 300 years a new political and social life was built up. By 700 B. C. commerce had again been established, city states had arisen with the aristocracy as the prevailing type of government, while the democracy had already begun the struggle

for a share of the government. During the next two centuries Greece came into contact with the East and became a more powerful factor in the world politics than she had ever been before.

In order to understand the sudden development of the Greek genius after 500 B. C. it is well to realize what had actually been accomplished between 1000 and 500 B. C. By this time the Greeks had risen in race consciousness to the belief that they were one in origin and culture; colonies had been planted all over the Mediterranean coasts; nearly every city had passed through various revolutions leading either to democracy or aristocracy; Sparta already ruled in military affairs; Athens led in the democratic movements; while Ionia held first place in affairs intellectual and artistic.

Period of State Supremacy (500-331 B. C.). From 492 to 480 B. C. came the inevitable conflict with Persia, and this period was followed by successive attempts at empire by Athens, Sparta and Thebes, and closed with the subjection of Greece by Macedonia in 338 B. C. During this time came the marvelous flowering of the Greek genius in literature, philosophy, science, sculpture, painting and architecture, while the best that was said and done in these lines was said and done at Athens. This city, ridiculously small when compared with any large city of the present day, produced more famous men in the age of Pericles (463-431) than any other country has produced in a century, while these intellectual giants lived among a people more keenly appreciative of things intellectual and artistic, and of more general culture, than any other body of men who have ever lived.

Following this period came the Peloponnesian War (431-404 B. C.), which involved the entire peninsula and resulted in the downfall of Athens and the rise of Sparta as a political power (See ATHENS, subhead *Peloponnesian War*). For 33 years after the Peloponnesian War, Sparta was supreme in Greece, a period marked by tyranny and oppression. At length the other states of Greece, under the leadership of Thebes, rose against Sparta. Led by the Theban generals, Epaminondas and Pelopidas, the allies won a decisive victory over the Spartans at Leuctra, 371 B. C. During the period of Theban supremacy democracy was the principal form of government in Greece. The leadership of Thebes, however, rested on the genius of her great statesman and general, Epaminondas, and it ended with his death, which occurred at the Battle of Mantinea, 362 B. C. There was no state left in Greece to assume the leadership, and she soon sank to a position of dependence. See THEBES; SPARTA; ALEXANDER THE GREAT.

Period of Foreign Rule. After the Battle of Mantinea came a period of anarchy, lasting over 20 years. In 338 B. C. Philip of Macedon became master of Greece, decisively overcoming Athens and Thebes at the Battle of Chæronea. Then a congress of Greek states acknowledged Macedonia as the head of Greece. Under Philip's strong rule rebellious outbreaks were quelled. At his death in 336 B. C., his son Alexander the Great succeeded to the throne. Alexander quickly subdued those states of Greece that rose in rebellion, and, when he had firmly established his authority there, proceeded against Persia. By his conquests Greek learning and culture were spread over the vast Persian Empire. Following the death of Alexander his kingdom was divided into three smaller kingdoms, and Greece was left a vassal of Macedonia. During the next two centuries there was continued internal dissension, and in 279 B. C. the Gauls invaded the country. In 146 B. C., when Corinth was burned and captured, Greece and Macedonia fell under the power of Rome, and Greece became a Roman province under the name of Achaia. After the division of the Roman Empire into the Eastern and Western empires, in 395, Greece became a part of the Eastern Empire, remaining under its control until the capture of Constantinople by the Turks, in 1453. After the fall of Constantinople Greece

became a part of the Turkish Empire. The country lapsed into poverty and anarchy under Ottoman tyranny, but the more independent and energetic of the people kept alive that spirit of independence which was to win them freedom.

Modern Greece. At the beginning of the 19th century the Greek people began a movement for a national revival, and in 1821 Alexander Ypsilanti headed a revolt and proclaimed the independence of Greece. From 1821 to 1828, under the leadership of Ypsilanti and with the help of Russia, France and England, she fought for freedom. In 1830 a congress of the European powers declared Greece an independent nation and forced Turkey to agree to this declaration. In 1832 Otho, second son of King Louis I of Bavaria, was made king by the powers, and three years later Athens was made the capital of the kingdom. In 1843 a bloodless revolution forced the King to grant a constitution, but the people still remained dissatisfied, and in 1862 Otho was deposed. In 1863 the second son of the King of Denmark became ruler as George I. He was succeeded in 1913 by his son Constantine.

In 1878, a boundary dispute between Turkey and Greece was settled in favor of the latter nation by a conference of ambassadors which met at Berlin. A war, disastrous for Greece, broke out between the two countries in 1897; the cause this time was the cruel treatment of the Cretans by the Turks.. As the result of this war Greece had to pay an indemnity of $18,000,000, while a slight change, favorable to Turkey, was made in the frontier. Later (1898) the powers of Europe forced Turkey to withdraw from Crete, and the island was placed under the protection of Greece. The Greek Christians, the Serbs, Montenegrins and Bulgarians living within Turkish boundaries have always been subject to the cruelties of their Mohammedan rulers and recent massacres led to the declaration of war against Turkey in 1912, made by Montenegro and joined later by Greece, Bulgaria and Servia. See BALKAN WAR.

In spite of their unsettled political affairs the Greeks have continued to be a poetical people, patriotic and proud of the historic importance of their country as well as of its recent advancement. Education, especially in literature and the arts, has been widespread, and the legends and history of ancient Greece are unconsciously learned by the youths. Schools are established in all of the towns and cities, and formal education, though not at present compulsory, is everywhere encouraged. The University of Athens is the principal higher institution. Aside from the native Greeks, Greece contains many Albanians, Turks and Europeans. Strangely, too, only about one-third of the Greek people live in Greece, the rest having emigrated temporarily to European Turkey, Bulgaria, the United States and other countries. The Greek Church, with the king as its head, is the established Church and includes fully nine-tenths of the people.

The government is a constitutional monarchy. The present constitution was adopted in 1864 and vests the legislative authority in a single house, called the Boule. Since 1911 a Council of State, somewhat answering the purpose of a second chamber of the legislative assembly, has been added as a department of government. Population, 4,600,000.

Greek Church, a religious organization calling itself the Holy Orthodox Catholic and Apostolic Church, in a wide sense including those Christians who accept the Greek rite. There are three important branches: the Church within the Ottoman Empire; the Church in the Kingdom of Greece; and the Russo-Greek Church in the Russian Empire. These agree in receiving the first seven general councils of the Catholic Church; and in refusing to accept the supremacy of the pope or any of the later councils of the Western Church. There is a close connection between the separation of the Greek and Roman churches and that of the Eastern and Western branches of the Roman Empire. The increasing importance of Constantinople and the rivalry between Church and State contrib-

uted to the growing spirit of independence on the part of the East, while the insertion of *filioque* (and from the Son) in the Nicene Creed and the question of papal supremacy were a continual source of discord. Doctrinal differences and the war of the Iconoclasts (See ICONOCLASTS) were additional elements in the movement which culminated in a formal division in 1054. The Greek Church admits the seven rites of the Roman Church — baptism, confirmation, communion, penance, extreme unction, holy orders and matrimony, though differing somewhat in their observance. Baptism consists of triple immersion, confirmation immediately following. In the Lord's Supper the Greeks admit the real presence of Christ in the elements, and both adults and children receive the sacrament. Confession and absolution by priests are recognized; honor is paid to relics; but the only graven image permitted is the cross. Among the fast periods kept are Pentecost and Lent; all Wednesdays and Fridays are observed. The Virgin Mary is especially revered. The public service is formal and impressive, the singing being performed by male voices alone. Priests and deacons marry, but bishops may not. Monasteries and convents are maintained. The chief difference between the Greek and Roman churches is the rejection, by the former, of the papal supremacy, and the refusal to permit *filioque* in the creed.

In regard to government, the Turkish Church is subject to the Patriarch of Constantinople, who may be appointed and deposed at the will of the Sultan of Turkey. The Russian Church is under the Holy Synod at St. Petersburg; the Czar of Russia is the recognized temporal head of the whole Greek Church. The National Church of Greece was established under a Holy Synod in 1833. Besides, there is a United Greek Church, which acknowledges the supremacy of the pope at Rome. This Church exists in Austria-Hungary, southern Italy, Poland and parts of Russia. The total membership of the Greek Church is 98,016,000.

Greek Fire, a name applied to several inflammable and destructive compounds used in the Middle Ages for purposes of warfare. The use of these combustibles by the Greeks for centuries gave them superior advantages, and they jealously guarded the secret of their composition. Greek fire appears to have been made principally of naphtha, sulphur and niter.

Greek Language. See LANGUAGE, subhead *Greek and Latin.*

Greeley, Colo., a city and the county seat of Weld Co., about 50 m. n.e. of Denver, on the Cache la Poudre River and on the Union Pacific, the Colorado & Southern and other railroads. It is the center of one of the most productive of the irrigated farming districts of the state, the principal crops being potatoes, sugar beets, peas, onions and cabbages. Some wheat is grown, and the raising of sheep and cattle is an important industry. The leading industrial plants are lumber yards, a large beet-sugar factory, a flour mill, an elevator and vegetable canning factories. Near the city are rich coal fields. Greeley is the seat of the Colorado State Normal School and has a public library and municipal parks. The place was founded in 1870 by a colony from New England and New York State, which, acting under the guidance of Nathan Cook Meeker, an agricultural journalist of New York, bought a large tract of land; and the whole colony was administered under laws arising from idealistic ideas of community life. The scheme received the moral support of Horace Greeley (in whose honor the settlement was named). A town was laid out in 1871 and the place was chartered as a city in 1886. Population in 1920, U. S. Census, 13,958.

Greeley, Horace (1811-1872), an American journalist and author, born in Amherst, N. H. After receiving a common school education, he entered upon an apprenticeship in a newspaper office in Vermont, and became an expert compositor. In 1831 he removed to New York City, working for some time as a journeyman printer, and later as a job

printer. In 1834 he undertook the establishment of a literary weekly, the *New Yorker,* and in conducting this periodical Greeley became so widely known and respected that he was selected by the Whigs to edit their campaign paper, the *Jeffersonian;* he continued in this work during 1838-39. In 1840 he started the *Log Cabin,* to further the campaign of William H. Harrison, and in a short time this paper had a weekly issue of from 80,000 to 90,000 copies. When the famous campaign was over Greeley founded the *Daily Tribune* (1841), which he edited until his death. The *New Yorker* and *Log Cabin* were merged into the *Weekly Tribune,* which eventually had a wide circulation throughout the Northern and Western states and exerted great influence.

In December, 1848, Greeley entered Congress to fill a vacancy, serving until the following March. He was an opponent of slavery and especially zealous in opposing its extension to the territory acquired from Mexico. Through the *Tribune* he furthered the anti-slavery movement until the struggle was over, and was influential, as a delegate to the Republican National Convention of 1860, in securing the nomination of Lincoln. While he favored the vigorous prosecution of the war, he was willing to have it ended by compromise, and in 1864 went to Canada to hold a fruitless peace conference with the Confederate agents. After the war he declared for universal amnesty and suffrage, and joined with others in signing the bail bond of Jefferson Davis.

From now on Greeley was prominent in the politics of his state, and in 1872 joined the body of Liberal Republicans who held a convention in Cincinnati previous to the regular convention, the latter of which renominated Grant (See POLITICAL PARTIES IN THE UNITED STATES). Greeley was nominated not only by the Liberal Republicans, but by the Democrats. The campaign was both bitter and strenuous, completely exhausting him, and he died shortly after the election, in which he was defeated. He was a man whom neither praise nor blame could swerve from what he considered a right decision, and throughout his journalistic career he set an example of moderation, fairness and truthfulness that has never been surpassed. His writings include *Hints Toward Reforms, History of the Struggle for Slavery Extension or Restriction in the United States, The American Conflict* and *What I Know of Farming.*

Greely, Adolphus Washington (1844-), an American soldier and explorer, born in Newburyport, Mass. At the outbreak of the Civil War he joined the volunteers, was finally brevetted major of volunteers and in 1868 was assigned to signal service. From 1876 to 1879 he constructed 2000 miles of military telegraph in the West. In 1881 he commanded an expedition to the Arctic regions, to establish a series of circumpolar stations for scientific observations, and penetrated to latitude 83° 24′, the highest northerly point reached up to that time. He made many valuable geographical discoveries, but of the 25 men who landed at Discovery Harbor in August, 1881, all but six, besides Greely, died of starvation at their permanent camp at Cape Sabine, where they were found by Capt. Winfield S. Schley in June, 1884. In 1887, as brigadier-general, Greely became chief of the signal service, and between 1898 and 1905 many thousand miles of wire and wireless telegraph were erected under his supervision in China, Cuba, Porto Rico and the Philippines. The following year, in command of the Pacific Division, he had charge of the relief of San Francisco. He wrote *Three Years of Arctic Service, American Weather* and *American Explorers and Travellers.* See POLAR EXPLORATIONS.

Green, John Richard (1837-1883), an English historian, educated at Magdalen College and at Jesus College. He took orders in 1860, became vicar of St. Stephen's, Stepney, in 1866, and was made librarian at Lambeth in 1869. Thereafter he devoted himself to history and politics. *A Short History*

of the English People was rewritten twice before Green published it in 1874. It was subsequently expanded into a four-volume *History of the English People,* which in 1882 was followed by his scholarly *The Making of England.* Following his death, his wife published his *Conquest of England.*

Greenback Labor Party. See POLITICAL PARTIES IN THE UNITED STATES, subhead *Greenback Labor Party.*

Greenback Party. See POLITICAL PARTIES IN THE UNITED STATES, subhead *Greenback Party.*

Greenbacks. See MONEY, subhead *Paper Money.*

Green Bay, Wis., a city, port of entry and county seat of Brown Co., 114 m. n. of Milwaukee and 198 m. n. of Chicago, on the southern extremity of Green Bay at the mouth of the Fox River, and on the Chicago & North Western, the Chicago, Milwaukee & St. Paul, the Green Bay & Western and other railroads. There is steamboat service to points on Green Bay, Mackinac Island, Milwaukee and other ports on the Great Lakes. The city has 12 m. of water front and a fine harbor accommodates considerable lake commerce. There is a complete electric railway system, and interurban lines up the Fox River Valley connect the city with Appleton, Neenah, Fond du Lac, Oshkosh and other towns and cities. Green Bay has an area of 13 sq. m. and is situated on high, level ground on both sides of the river, which is here spanned by a number of bridges. The city is an advantageous distributing point for northeastern Wisconsin.

PARKS AND BOULEVARDS. The city contains a number of parks with an area of 32 acres, Hagemeister and Union parks being the largest. Bay Beach is a noted resort and there are many summer houses located around the bay. Green Bay has beautifully shaded and paved streets, picturesque drives and many elegant residences.

PUBLIC BUILDINGS. Among the noteworthy buildings are the Federal Building, county courthouse, Masonic Temple, National Fraternal League Building, Y. M. C. A. Building, custom-house and bonded warehouse, city hall, a number of banks, Elks' Clubhouse and good municipal buildings. There are about 27 churches, including a Catholic cathedral. The city is also the seat of a Catholic see, being the earliest bishopric established in this portion of the country.

INSTITUTIONS. The educational institutions include several high schools, public and parish schools, St. Joseph's Academy, academy for young ladies, the Kellogg Library and a business college. Among the benevolent and charitable institutions are a number of hospitals, including an isolation hospital, almshouse and an orphans' home. The city is the seat of the Wisconsin State Odd Fellows' Home. The state reformatory is located about five miles southwest of the city.

INDUSTRIES. Green Bay is an important industrial and manufacturing center. The industries comprise flour mills, sawmills, paper mills, canning factories, sulphite mills, furniture and woodenware factories, a pickle factory, farm-implement works, brick and tile works, soap works, woodworking machinery plants, confectionery and biscuit factories, boiler and machine shops, coffin and casket works, cornice works and shoe and glove factories. There are also lumber yards, railroad repair shops and grain elevators. A large fish-shipping business is carried on and there is an extensive coal import trade. Many acres of Oneida Indian Reservation lands adjoin the city.

HISTORY. The first visit to what is now Green Bay was made by Jean Nicollet in 1634, and a Jesuit mission was later established by Allouez. The place was settled by the French, but fell into the hands of the English at the close of the French and Indian War. The Americans established a fort on the opposite side of the river in 1816 known as Ft. Howard, which grew to be the center of a prosperous town and was annexed to Green Bay in 1895. Population in 1920, U. S. Census, 31,017.

Greene, Nathanael (1742-1786), an American general of the Revolutionary War, born at Patowomut, R. I. In 1770 he entered the Rhode Island Legislature, where he became such a belligerent advocate of freedom that he was excommunicated by the Society of Friends, to which he had belonged. Four years later he enrolled as a private in the Kentish Guards, which he himself had organized, and in 1775, as brigadier-general, he marched to Cambridge, Mass., with an almost model brigade. Greene soon won the esteem of Washington, who often consulted him in times of perplexity, and on Aug. 9, 1776, he became major-general with command of the forces on Long Island. He distinguished himself there save at Ft. Washington, Nov. 16, 1776, when a prompt and decisive move on his part might have averted one of the most crushing blows that overtook the Americans during the entire struggle. Later Greene led divisions at Trenton, Princeton and Brandywine. His skill at Germantown received the unqualified praise of Washington. Subsequently he took part in the Battle of Monmouth and before Newport, R. I. In 1780, accompanied by Morgan, he went to assume command of the Southern army. Greene's strategy found victory even in defeat, and he succeeded in gaining Georgia and the Carolinas for the Americans. After the Battle of Eutaw Springs, Sept. 8, 1781, Congress presented him with a British standard and a gold medal. With the close of the war he returned to Rhode Island; but in 1785 he moved to a valuable estate near Savannah, of which the State of Georgia had made him a present. He sold the land given to him by South Carolina to pay debts, which he had assumed to secure supplies for his soldiers. June 12, 1786, he suffered a sunstroke and a week later he died. Of the American Revolutionary generals, Greene ranked next to Washington as a strategist and as an example of consummate generalship.

Greenfield, Mass., county seat of Franklin Co., 36 m. n. of Springfield, the capital of the state, and 56 m. w. of Fitchburg, on the Connecticut River, 2 m. above the mouth of the Deerfield River, and on the Boston & Maine Railroad. The chief manufactures include machinists' tools, silverware, agricultural implements, paper boxes, woodenware, children's carriages, toys, cement building blocks and boots and shoes. Greenfield is a popular summer resort. It was settled in 1686, but remained a part of Deerfield until 1753. Population in 1920, U. S. Census, 15,462.

Green Fly. See A'PHID.

Green Heron. See HERON.

Greenhouse, a structure designed to furnish protection to plants. It may be also a hothouse for the forcing of the growth of plants, or a conservatory for the care and exhibition of flowers, or an orchard house for the protection of fruit trees. Greenhouses are provided with glass roofs and sides to let in the sun's heat, and are generally furnished with some system of heating. Hothouses now produce a large amount of early vegetables and fruits which bring high prices. See HOTBED AND COLD FRAME.

Greenland, the largest island in the world. Baffin Bay, Davis Strait and Smith Sound separate it from the Continent of North America. Its area is estimated at 512,000 sq. m., and the maximum height of its mountainous surface is about 8000 ft. above sea level. Petermann Peak is 11,000 ft. high. Characteristic features of its surface are deep and somber fiords between the high mountains, and a great number of glaciers. In summer the vegetation is abundant, consisting of berries, lichens, mosses, shrubs, herbs, saxifrage and poppies. Vegetables are cultivated under glass. The fauna consists principally of the Eskimo dog, musk ox, Arctic fox, hare, ermine, lemming and reindeer. The surrounding waters are the hunting grounds for the whale. The seal and walrus have supplied the bulk of the native food. Many necessaries are imported from Denmark. Greenland is supposed to have been visited by Eric the Red, a Norseman, in 985, and

a settlement made under his leadership. Population in 1901, 11,893. See POLAR EXPLORATIONS.

Green Mountains, a range of the Appalachian system, extending from Canada through Vermont, Massachusetts, and Connecticut to Long Island Sound. In Massachusetts they are known as the Berkshire Hills, and in Connecticut as the Taconic Mountains. The Green Mountains are among the oldest mountain ranges in North America. They are low mountains with rounded summits and forest-covered slopes. Much of the timber consists of spruce, fir and hemlock—all evergreens—and from this characteristic the mountains take their name. Mt. Mansfield, the highest peak, has an altitude of 4364 ft. Killington, Camel's Hump, Equinox and Jay are other important peaks. The Green Mountain region is a favorite summer resort.

Greensboro, N. C., a city and the county seat of Guilford Co., 81 m. n.w. of Raleigh, on several lines of the Southern Railway. The city lies in a section rich in mineral resources; and gold, copper and iron are mined. Chief among the farm crops of the surrounding section are tobacco, cotton, fruit and Indian corn; and a large trade in tobacco, iron and coal is carried on. Among the industrial plants are cotton mills, blast furnaces for the manufacture of Bessemer steel, sawmills, foundries, flour mills, terra-cotta works, cigar factories, brick and tile works and manufactories of cotton goods, machinery, lumber, sashes, doors, blinds, flannel, carpets, spokes, handles, bent rims, bobbins and cotton-mill supplies. The city is a focus for a large insurance business.

The educational institutions include Greensboro Female College (Methodist Episcopal, South), opened in 1846; a state normal school; Guilford College (coeducational), maintained by the Society of Friends; and three institutions for negroes—the North Carolina State Agricultural and Mechanical College, Immanuel Lutheran College (Evangelical Lutheran) and Bennett College (Methodist Episcopal). Other features of the city are a Carnegie library, an auditorium and St. Leo Hospital. About six miles northwest of the city is Battle-Ground Park, a 100-acre tract on the site of the Battle of Guilford Courthouse, fought in March, 1781, by Lord Cornwallis and Gen. Nathanael Greene; and it is in honor of the latter that Greensboro is named. Greensboro was founded in 1808, organized as a town in 1829 and chartered as a city in 1870. Population in 1920, 19,861.

Greensburg, Pa., county seat of Westmoreland Co., 31 m. s.e. of Pittsburgh, on the Pennsylvania Railroad. Several private institutions for secondary education are located here, among them, St. Joseph's Academy. The borough has an extensive trade in coal, which is mined in the vicinity, and manufactories of glass, iron, nuts, bolts, lumber, brick-heating apparatus, etc. Population, 1920, U. S. Census, 15,033.

Greenville, Miss., a city and the county seat of Washington Co., about 137 m. s.w. of Memphis, Tenn., on the Mississippi River and on the Southern, the Yazoo & Mississippi Valley and other railroads. Steamboats connect it with other ports on the Mississippi. The city is the center of a productive cotton section and carries on a large trade in this product. It has cotton mills, cotton compresses, cottonseed-oil mills and saw and planing mills. There are municipal parks and playgrounds. Population in 1920, U. S. Census, 11,560.

Greenville, S. C., a city and the county seat of Greenville Co., 153 m. n.w. of Columbia and 160 m. n. e. of Atlanta, Ga., on the Southern, the Charleston & West Carolina and other railroads. The city is situated in an undulating country near the outlying spurs of the Blue Ridge Mountains and has a delightful climate. Among the industrial plants are cotton mills, ironworks, foundries, carriage and wagon works, flour mills and several small establishments. The important educational institutions are Furman University (Baptist); Green-

ville Female College (Baptist); Greenville College for Women; and Chicora College (Presbyterian), for women. A business college and a military institute are located here. Greenville was settled in 1784 and incorporated in 1831. Population in 1920, U. S. Census, 23,127.

Greenville, Tex., a city and the county seat of Hunt Co., about 54 m. n.e. of Dallas and 235 m. n. of Houston, on the Missouri, Kansas & Texas, the St. Louis Southwestern, the Texas Midland and other railroads. Among the industrial plants are cotton compresses, cottonseed-oil mills, flour mills, machine shops, brickyards and stockyards. Distinguishing features of the city are Burleson and Holiness colleges and public parks. Settled in 1844, Greenville was incorporated in 1875. Population in 1920, U. S. Census, 12,384.

Green Vitriol, *Vit' ri ul.* See COPPERAS.

Greenwich, *Grin' ij,* a borough of London, England, in Kent, formerly a town, 5 m. s.e. of St. Paul's Cathedral and on the right bank of the River Thames. Objects of interest in the city are the Greenwich Royal Observatory, established in 1675 (from which point longitude in calculated and used by British astronomers and geographers, and also by most of the geographers of the world, and which establishes the time for all parts of the United Kingdom), the Royal Naval College and the Greenwich Observatory. From the 13th to the 17th century it was a royal residence, and marks the birthplace of Henry VIII, Queen Mary and Queen Elizabeth. Population about 185,000.

Greenwich, Conn., a town and popular summer resort of Fairfield Co., 28 m. n.e. of New York City, on Long Island Sound and on the New York, New Haven & Hartford Railroad. The town is attractively situated and is a suburban resort for many New York people. There are many handsome residences. The Greenwich Academy, Rosemary Hall and the Brunswick School are located here. Greenwich was settled in 1640 and was a part of the Dutch Province of New York from 1642 until 1650, when by a Dutch and English commission agreement it became part of Connecticut; it marks the line of boundary. Population in 1920, 22,123.

Greenwood, James M. (1836-1914), an American educator, born near Springfield, Ill. He studied in the public schools, and moved with his parents in 1852 to Adair County, Mo. Here he pursued his studies by himself while working on a farm. Later, he spent a year in Canton Seminary. From 1867-1874 he taught mathematics, astronomy and logic in the normal school at Kirksville, Mo. In 1874 he became superintendent of schools at Kansas City, Mo. He has published *Principles of Education Practically Applied.*

Greg'ory, the name of 16 popes and one anti-pope.

SAINT GREGORY (about 540-609), pope from 590 until his death, was born at Rome and educated for a public career. He turned early to the Church, however, and became abbot of St. Andrew's, where he was popular in spite of his severity. Gregory determined to undertake personally the conversion of Britain, but before his task was well begun he was recalled to become pope. He ruled wisely and zealously and is known as a great organizer of missionary enterprise.

GREGORY XIII (1502-1585) was pope from 1572 until his death. He gave great aid to the Jesuits, but is remembered chiefly for his great public works and for his reform of the calendar (See CALENDAR).

Gregory VII (about 1015-1085), the Great Hildebrand, one of the greatest ecclesiastical geniuses of history. He became pope in 1073. In his Paschal Synod (Rome, 1074), he threatened with excommunication all who received sacred ministrations from the so-called married clergy. Blood was shed, especially in Germany, France and Italy, before the clergy submitted to this decree. Gregory's law against investitures, propagated in 1075, precipitated one of the greatest religious struggles

of all ages. It was aimed especially at Henry IV of Germany, who openly sold high Church offices to the notoriously immoral. But Henry was undaunted, even when Gregory excommunicated five of his advisers. Consequently Gregory summoned him to Rome.

Instead of obeying, Henry undertook to depose Gregory at the Council of Worms on Jan. 24, 1076. This so incensed the Pope that he immediately absolved all Christians from allegiance to Henry, with the result that the Germans proceeded to select a new king. Brought to terms, Henry now asked and obtained reconciliation with Gregory, but before long proceeded to act as impiously as before. His subjects, thoroughly aroused, hereupon elected Rudolph of Swabia as king in 1077. Civil war followed. Gregory again excommunicated Henry in 1080; but Henry in retaliation set Guibert of Ravenna on the papal throne, holding Gregory a prisoner, during three years, in the Castle of St. Angelo. Saddened and worn, Pope Gregory died in seclusion at Salerno. See HENRY IV.

Gregory, Lady Isabella Augusta Persse, a British woman of letters, one of the group of modern writers who have found their inspiration in the people and soil of Ireland. She was born (Persse) in Roxborough, County Galway, Ireland, and grew up with a romantic love for Ireland that later found definite literary expression. When, in 1893, Dr. Douglas Hyde founded the Gaelic League, the object of which was the preservation of the Irish spoken language and the Irish nationality, Lady Gregory entered into the movement with enthusiasm. She learned the Irish language, made translations of Irish songs and ballads, edited and made revisions, and became a prominent figure in the production and presentation of a group of Irish plays. Associated with her were Dr. Hyde, William B. Yeats and John M. Synge. In her two books, *Cuchulain of Muirthemne* and *Gods and Fighting Men,* she gathered together and retold in the Elizabethan English of her neighborhood, the great legends of Ireland. Among other writings are *Poets and Dreamers, The Kiltartan Wonder Book* and the plays—*Spreading the News, The Rising of the Moon* and *The Workhouse Ward.* See IRISH PLAYS.

Grenadier, *Gren"a deer'*, the name once applied to a soldier who threw hand grenades, which were small metal or glass bullets filled with powder and fired by a fuse. Companies of grenadiers formed a part of the troops of both English and French armies up to the time of the invention and use of the musket. The grenadiers were usually soldiers above ordinary height and were distinguished by special uniform.

Grenfell, Wilfred Thomason (1865-), a British medical missionary, author and lecturer, a graduate of Oxford. Shortly after completing his medical education at London Hospital, he entered the service of the Royal National Mission to Deep Sea Fishermen. Fitting out the first hospital ship for the North Sea fisheries, he cruised with the fishermen from the Bay of Biscay to Iceland, establishing homes for them on land and arranging mission vessels for their use at sea. In 1892 he went to Labrador. There he established several hospitals, an orphanage and a series of cooperative stores, and started many small industrial schemes for the alleviation of the poor. Dr. Grenfell has lectured extensively in the United States. Among his publications are *Adrift on an Ice-pan, A Man's Faith, The Harvest of the Sea, Off the Rocks, Labrador* and *Down to the Sea.*

Gresham's Law, a term used to designate the economic principle, first propounded by Sir Thomas Gresham, that when good and bad money are both in use the bad will tend to drive out the good; because the money having the greater intrinsic value will be used in the foreign trade, where only the bullion value is recognized. The money of less intrinsic value will thus be left for domestic circulation. See MONEY, subhead *Varieties.*

Gret'na Green, or **Graitney,** Scotland, a village on the Solway Firth, 8 m. n. of Carlisle. According to an old Scottish law, the statement before witnesses of an unmarried couple that they were man and wife, constituted a legal marriage. Gretna Green became notorious as a wedding place of runaway couples from England, who availed themselves of this peculiar marriage law. The term "Gretna Green marriage" is now used to designate a runaway marriage.

Grévy, *Gra"ve',* **François Paul Jules** (1807-1891), a French statesman, born at Mont-sous-Vaudrey. He studied law in Paris, while a student participating in the Revolution of 1830. In 1848 he was elected to the Constituent Assembly, distinguishing himself as an orator. Retiring from politics after the *coup d' état* of Louis Napoleon, he devoted himself to his profession and rose to eminence. In 1869 he again entered the National Assembly, and two years later he was there chosen president, holding this position until 1879, when, Marshal MacMahon having resigned as president of the republic, he was elected his successor. He won the election to a second term as president in 1885, but, hampered by ministerial complications, he was forced to resign in 1887.

Grey, Lady Jane (about 1537-1554), the daughter of Henry Grey, afterward Duke of Suffolk, and the grandniece of Henry VIII. Edward VI settled on her the succession to the crown, but nine days after the proclamation of her accession, Mary's claims were recognized and Lady Jane was sent to the Tower. Four months later she and her husband, Lord Guilford Dudley, were beheaded.

Grey, Sir Albert Henry, FOURTH EARL OF NORTHUMBERLAND (1851-), an English statesman, educated at Harrow and at Trinity College, Cambridge. When he was 26 he married Alice Holford, sister of Lord Minto, and three years later entered the British House of Commons, where he remained for six years. He then succeeded Cecil Rhodes in representing the British South Africa Company. From 1904 to 1911 he was governor-general and commander-in-chief of Canada, his term of office being extended for 12 months at the instance of Edward VII. While filling this post, Earl Grey closely identified himself with every movement calculated to advance Canadian interest. He was also lord lieutenant of Northumberland and distinguished himself in the Boer War.

Greyhound, a tall, aristocratic dog, noted for its speed and its keen sight, two qualities which make it particularly valuable as a hunting dog. The coat of the common English greyhound is smooth and generally gray in color; its name, however, does not refer to its color, but to the Irish word *grey,* meaning dog. Built for speed, its entire frame—the body, the strong legs, the pointed nose and the tail—is slender and elongated. The ears are long and pointed, sometimes held erect and sometimes drooping. The sense of smell is defective in all greyhounds, but a remarkable vision more than makes up for the loss. The general class of greyhounds includes the deerhound, which has a shaggy coat and is of heavier build; the Irish wolfhound; the Italian greyhound; and the hairless dogs of Central America. Lurchers and whippets are a cross between greyhounds and other species.

Grieg, *Greeg,* **Edvard Hagerup** (1843-1907), the most celebrated of Norwegian composers, was born at Bergen. He was educated at Leipsic. His greatest achievement was in the field of composition. He wrote for violin, piano and for orchestra, besides a large number of songs. His music has a marked national character, much of it being based upon Scandinavian legends and folk tales. His most famous orchestral work is the *Peer Gynt* suite, founded upon the drama of the same name by Ibsen.

Griffin, Ga., a city and the county seat of Spaulding Co., 43 m. s. of Atlanta, on the Central of Georgia, the Southern and other railroads. The industrial interests of the town are centered in cotton mills, cotton gins, machine shops, foundries and furniture factories. The making of wine was an im-

portant industry. Griffin is an attractive resort. In the vicinity is the Georgia State Agricultural Experiment Station. Population in 1920, 8,240.

Grimm, Jacob Ludwig Karl (1785-1863), and **Wilhelm Karl** (1786-1859), two German philologists, brothers, born in Hanau. They formulated what is popularly known as *Grimm's Law,* one of the most important of phonetic laws. They compiled the great *Dictionary of the German Language,* and Jacob Ludwig Grimm wrote a *History of the German Language,* a *German Grammar, German Mythology* and *Origin of Language.* They founded the science of folklore by collecting from manuscripts and books and by word of mouth the popular legends and fairy tales of their country; and because of the *Nursery and Fireside Stories* "Brothers Grimm" have become known the world over.

Grind'stone", a flat, circular stone held in a frame by a horizontal axis upon which it is made to revolve. It is cut from blocks of sandstone of varying degrees of coarseness. The larger stones used in factories sometimes weigh several tons, and are operated by machinery; the smaller ones are revolved by hand or foot power. Artificial grindstones of fine texture are made from emery and are used for grinding metal. Those made from carborundum are much used for grinding precious stones.

Grippe. See INFLUEN'ZA.

Grosbeak, *Grose' beek",* a bird of the Finch Family. The rose-breasted grosbeak is a little smaller than a robin (eight inches in length). The male may be known by its black head, throat and back, white-spotted wings and tail, and particularly by the brilliant rose-colored spot on the breast. The female has a buff-colored back and breast streaked with brown. The grosbeak is a songster of the highest order, its notes somewhat resembling those of the oriole. Unlike most birds, it sings at night. The nest is very loosely constructed and is built in a low bush or vine and contains two to four brown-spotted eggs, which both sexes incubate. The young leave the nest when about 11 days old and begin to sing when ten weeks old. These birds are largely insect feeders, eating by preference the potato beetle, and for this reason they are called by the farmers of Pennsylvania "potato-bug birds."

Grote, George (1794-1871), an English historian, born in Kent. His principal literary work was his *History of Greece,* to which he gave the latter years of his life. This work is in 12 volumes, and is considered the most complete history of Greece published. Grote went to Parliament in 1832 on the Liberal ticket and was twice reelected. Up to the time of his death he was president of University College and vice-chancellor of London University.

ROSE-BREASTED GROSBEAK

Grotius, *Gro' shi us,* or **De Groot, Hugo** (1583-1645), a Dutch scholar born at Delft, Netherlands, and educated at the University of Leyden. He is noted for his great work *On the Law of War and Peace,* which gave a clear exposition of the fundamental purposes of international law, and is still considered a standard authority on the subject.

Grouchy, *Groo"she',* **Emmanuel,** MARQUIS DE (1766-1847), a French marshal, born in Paris, France. He joined the Royal Life Guards at the age of 14 years, on the side of the Revolutionists. He served in the Prussian War in 1806; and the following year was in the war with Russia, where he distinguished

himself and was made a marshal of France. In 1815 when Blücher was defeated at Ligny, Grouchy was ordered to push the Russian retreat. Upon Napoleon's second abdication and the second restoration, Grouchy was banished and lived for some time in Philadelphia, Pa. Returning to his native land in 1821, he was again made a marshal of France.

Ground Hog. See WOODCHUCK.

Ground Ivy, Gill-over-the-Ground or **Creeping Charley,** a low, spreading

GROUND IVY

herb of the Mint Family, common in waste or shaded grounds which have plenty of moisture. It is often found growing thickly in the grass of dooryards, where it creeps so closely along the ground that it is hardly noticeable. The leaves are rounding, with wavy margins, much like those of the catnip, to which it is closely related. The stems are square and slightly hairy. The flowers are small, two-lipped and light blue in color. The stems, leaves and flowers all have a slightly pungent taste and odor, common to members of this family. Ground ivy is commonly called a weed, because it spreads so rapidly, but its delicate flowers and beautiful dark green leaves make it really an ornamental herb.

Ground Pine. See CLUB MOSS.

Ground Robin. See TOWHEE.

Ground Squirrel, a name applied to a class of Rodents of the Squirrel Family, whose technical name means food-storers. They are small, active animals with sharp-toed feet, lengthened craniums and large cheek pouches. Their homes are burrows where they store, during the summer and autumn, the nuts and dried roots which are to be their food during the winter. There are many varieties, the most common American species being generally spoken of as the chipmunk. See CHIPMUNK.

Grouse, a family of rough-footed, gallinaceous birds found generally in temperate or colder regions of Europe, Asia and North America. The family includes such birds as the quail, partridge, blackcock, ptarmigan, prairie hen and ruffed grouse. The nests are made on the ground, generally hidden by tall grass or sheltering shrubs, and contain from 10 to 14 greenish-tan or brown-speckled eggs. The young feed upon insects, but the older birds prefer grain and are destructive of the farmer's fields. See QUAIL; PARTRIDGE; RUFFED GROUSE; CAPERCAILLIE.

Grow, Galusha Aaron (1823-1907), an American lawyer and statesman, born in Ashford, Conn. He entered Congress from Pennsylvania in 1851 as its youngest member, and served for 12 years, first as a Democrat, then as Republican. He was speaker of the House from 1861 to 1863. For ten years he introduced at the beginning of each Congress a free-homestead bill, until it became a law in 1862. After an interval of 30 years he served again in Congress from 1894 to 1903 as congressman-at-large from Pennsylvania.

Guadalajara, *Gwah"thah lah hah' rah,* a city in Mexico and the capital of the State of Jalisco. It is situated on the

Santiago River 125 m. from the Pacific Ocean and 275 m. n.w. of the City of Mexico. Guadalajara is among the most pleasant of Mexican cities. Among the most beautiful drives is that of the Paseo, along one of the branches of the river and terminating in the famous Alameda, or public garden. The most interesting building is the great cathedral in Plaza Mayor. The government palace in the same square, is in Spanish style and is a stately building of pleasing appearance. Other interesting edifices are the mint, the library, the Academy of Fine Arts, the Teatro Degollado and the large penitentiary built of massive granite blocks. Among the educational institutions are the university, the national college, an Episcopal seminary and fine public schools. There are many charitable institutions. The chief industries of the city are those connected with the iron and steel works, and with the manufacture of glass and artistic pottery. Other manufactures are those of textiles, leather, furniture, hats and candies. Population, 101,208.

Guadalquivir, *God"al kwiv' er,* a river of southern Spain, rising in the mountains of the Province of Jaen and flowing in a southwesterly direction to the Atlantic. Its length is 360 m. It has many large tributaries, and in one part of its course it separates into three channels, forming the two islands known as Isla Mayor and Isla Menor. The cities of Seville and Cordova lie upon its banks and large boats can ascend the river to the former city.

Guadalupe Hidalgo, *God"a loop' Hidal' go,* **Treaty of,** the treaty made Feb. 2, 1848, between the United States and Mexico, which ended the Mexican War. By this treaty the Mexican Government ceded to the United States the territory of Texas, New Mexico and a part of California and agreed upon the Rio Grande River as the boundary between Mexico and Texas. The United States agreed to pay Mexico $15,000,000 and to assume all claims of its citizens against Mexico arising before the treaty. It also reserved to Mexicans in the ceded territory the right to remove or remain and assured protection of their rights of property. See MEXICAN WAR.

Guam, *Gwam,* an island of the Ladrone group, acquired by the United States from Spain in 1898. It has an area of only 200 sq. m. and is low in the north, but rises to a moderate elevation in the south. Guam is of coral formation, has a fertile, well-drained surface and is covered with forests. Coconut, breadfruit, rice, sugar and indigo are cultivated. Agaña, the capital, has San Luis de Apra as its port. The island is of especial importance to the United States since it has been made a landing place of the Pacific cable, and will be even more useful after the opening of the Panama Canal. The executive officer is a governor appointed by the president. Population, 12,240.

Guano, *Gwah' no,* the excrement of sea birds, once found in large quantities upon the islands of the coast of Peru and, because of its rich nitrogen and phosphorus content, used extensively as a fertilizer. The largest deposits of guano having been exhausted, that upon the market at the present time is commonly a manufactured product obtained from the refuse at fish canneries and known as fish guano. Another variety, made at slaughter pens, is known as blood guano. At present the menhaden, a fish caught in large quantities upon the New England coast, is used almost entirely for the production of this fertilizer. See MENHADEN; FERTILIZER.

Guaranty, *Gar' an ty,* or **Guarantee,** a warrant or contract by which one becomes responsible for the debts, defalcation or miscarriage of another. At common law a guaranty is considered binding, whether written or oral. Many so-called guaranties, however, such as the guaranty of a salesman of the quality of his goods or of a certain per cent profit on an investment, do not fall within the legal requirements and are, therefore, worthless.

Guardian, *Gar' de an,* one having the lawful control of the person or property,

or both, of a person under legal age to care for himself, or of a feeble-minded or insane person. In the United States the term without qualification means one who has control of the person and property of an infant; that is, a person under 21 years of age if a man, and under 18 years of age if a woman, though these limitations may vary in different states. Guardians are usually appointed by parents or courts, and in most states they are strictly accountable to the probate court of their district or county. The authority of a guardian is similar to that of a parent.

Guatemala, *Gwah" te mah' lah.* See CENTRAL AMERICA.

Guava, *Gwah' vah,* a low tree of the Myrtle Family growing in both the East and the West Indies, but probably a native of the latter. The tree grows to a height of about 20 ft. and has many branches, which are thickly covered with long, smooth leaves. The flower of the white, or lemon, guava is a long white blossom having a pleasing fragrance. The fruit, which is yellow when ripe, has a brittle rind, within which is a flesh-colored pulp used in making jellies, preserves and marmalade. The seeds are numerous and extremely hard. Other varieties of the guava are the strawberry guava and the red guava. The fruit of the latter is a beautiful wine color, but less pleasant to the taste than that of the lemon guava.

Guayaquil, *Gwi"ah keel',* or **Santiago de Guayaquil,** a city and the chief seaport of Ecuador, capital of the Province of Guayas, situated on the Guayas River, 33 m. above its mouth. The unsatisfactory drainage system of the streets, the surrounding marshes and the floods in rainy seasons make the city unhealthful. Recent improvements in lighting, tramway and telephone service have been made, and several fine buildings added. The exports are cocoa, ivory, gold, silver, Panama hats, cotton, hides and cinchona bark. Population estimated at 51,000.

Guayule, *Gwah yoo' la,* a gum produced by a Mexican and Texan plant of the Thistle Family and used there, and to a slight extent elsewhere, as a substitute for India rubber. The plant from which the gum is produced is also frequently called guayule, having no other common name.

Gudgeon, *Guj' un,* a European food fish of the Carp Family found in large schools upon gravelly beaches. It is a trim, plump fish, with a broad body and fleshy tail. It is probably among the most common fish taken by young English fishermen. The Niagara gudgeon, probably introduced from England, is smaller, and though of excellent flavor is not commonly considered a food fish.

Guelder-Rose, *Gel' der-Roze,* or **Snowball Tree,** an ornamental, flowering shrub of the Honeysuckle Family, generally known here under the latter name. It is a cultivated shrub, erect in form and growing to a height of from seven to ten feet; the bark is somewhat rough below but smooth on the finer branches. The leaves are generally three-lobed with finely-cut margins. The flowers, which give the plant its popularity, are big balls of blossoms, which when mature are pure white, but when opening change from leaf-green to white. The single blossoms may be either sterile, that is, not for fruit production, or fertile. The outer ones are sterile and are much larger than the inner ones; all have short tubes and evenly-divided, five-lobed corollas. The fruit is a sour, red berry which is often substituted for cranberries, and thus the plant derives its name of highbush cranberry. The English name comes from the plant's being a native of the Dutch Gerderland.

Guelph, *Gwelf,* a city of Canada in the Province of Ontario, situated on the Speed River, in a fine agricultural district. In addition to the municipal and county buildings is found the Ontario Agricultural College, which is one of the best agricultural colleges in America. A waterfall of 30 ft. in the river furnishes power for numerous mills and factories. The leading manufactures are agricultural implements, musical instruments, sewing machines, furniture and woolen

goods. Stock raising is also an important occupation, and fruit, grain and live stock are the principal exports. The first settlement was made in 1827, and the town became a city in 1877. Population in 1911, 15,175.

Guelphs and Ghibellines, *Gib' el inz,* names probably corrupted by the Italians from the German Welf and Waiblinger. The most popular version is that the names were used as battle cries between the soldiers of Welf VI of Bavaria and Conrad of Hohenstaufen, who owned the estate of Waiblinger. The members of the Lombard League became known as Guelphs in Italy in their struggle against Frederick II, and his followers were called Ghibellines. The story of the fierce struggle of these two parties is the story of Italy in the Middle Ages. In general, the Guelphs were opposed to the rule of the German emperor in Italy and allied themselves with the pope, while the Ghibellines wished for a strong central government and favored the rule of the emperor.

Guernsey, *Gurn' zy,* an island of the British Channel belonging to the group called the Channel Islands. It is the second of the group in size and has an area of 24½ sq. m., most of which is rocky and picturesque. On the south of the island are many resorts attractive to summer visitors. Gardening, floriculture and horticulture, the quarrying of granite and fishing are the chief industries. Port St. Peter is the capital and chief city. Population of the island, 40,500.

Guiana, *Ge ah' na,* a region of South America, bounded upon the n. by the Caribbean Sea, on the e. and s. by Brazil and upon the w. by Venezuela. It lies between the basins of the Orinoco and the Amazon and rises from a swampy coastal plain, rich in tropical vegetation, to low mountain ranges containing gold, iron, mercury and precious stones. Guiana is drained by many rivers, the most of which flow toward the north. Much of the interior is unexplored but is known to contain forests of valuable wood. Politically, Guiana is divided into three parts: British, Dutch and French Guiana.

British Guiana. This is the largest and the westernmost of the three. It has an area of 90,277 sq. m. The principal crops are rice, sugar cane, maize, wheat, cocoa, vanilla, tobacco and cinnamon. The exports are sugar, molasses, rum, lumber, gold and diamonds. The government is vested in a governor and a government secretary, assisted by a Court of Policy. Georgetown is the capital city and New Amsterdam is the only other city of importance. The population is about 296,000, not including the aborigines occupying the unexplored depths of the forest.

Dutch Guiana, or Surinam. This is the middle region of Guiana and is a possession of the Dutch. It is separated from Brazil by impassable forests and from British Guiana by the Corentyn River. Much of Surinam is unsettled, for where the forests do not cover the land there are swampy districts and sandy tracts. The language, laws and coinage are all Dutch. The products are practically the same as those of British Guiana. The government is administered by a governor, a vice-president and a council of three members, all appointed by the Dutch Crown. The capital is Paramaribo. Its area is 46,060 sq. m., and its population, exclusive of the natives in the forests, is 85,100.

French Guiana. This is the smallest of the three divisions, having an area of but 34,060 sq. m. It is separated from Dutch Guiana by the Maroni River and from Brazil by the Oyapok. In its products, its low swampy coast and its rolling mountains, it resembles the other two divisions, although less of its territory is given over to agriculture. Gold washing is the most profitable pursuit. The colony includes the Island of Cayenne, upon which Cayenne, the capital, is situated. The first French settlement here was in the Island of Cayenne in 1664, but at present it is used chiefly as a place of banishment for criminals and political offenders. The population of French Guiana is 27,000.

Guido Reni, *Gwe' do Ra' ne,* (1575-1642), an Italian painter of the School of Bologna, born at Calvenzano near Bologna. He studied with Calvart and Caracci, but early left to study at Rome, where he remained for 20 years. There in the garden house of the Rospigliosi Palace he painted his famous picture which he called *Phœbus and the Hours Preceded by Aurora;* it is now generally spoken of as merely the *Aurora.* This is his masterpiece and gives a good idea of his later style. Guido spent a part of his time in Naples, but being driven out by the enmity of fellow artists he returned to Bologna, where he established a large school with more than 200 students. Guido's pictures are generally well known and are admired for their softness of coloring and the beauty of form in the figures. He painted chiefly from Biblical subjects, but also painted a few pleasing portraits. Among his best works are *The Crucifixion of St. Peter* in the Vatican, the *Pieta* in the Church of the Mendicanti, *Fortune* in the capitol at Berlin, and *Samson Drinking from the Jawbone of an Ass.* Many of his pictures are in the Louvre and seven are in the National Gallery of London.

Guild, *Gild,* a society for carrying on some particular line of work, such as handcraft or commerce. Guilds are of ancient origin and were very influential in Europe during the Middle Ages. In Germany in the 13th century they obtained the right of bearing arms for the defense of their own interests, and in time they became so powerful that they resisted and overcame the nobility. The by-laws of the German guilds regulated the learning of apprentices, the practice of one's trade as a journeyman and the requirements of a master. Finally their political influence became so strong that in the 18th century edicts were issued against them, and in the 19th century in most of the German states freedom was granted to all to engage in any occupation without joining the guild. In England their influence was largely political, since one gained the right to vote by joining a guild and because they were in sympathy with the democratic element of the constitution. In the city of London there are several guilds which are important corporations. Their chief functions consist in managing large funds left in trust for benevolent purposes and relieving poor and disabled members. In recent times the guilds have been merged with or changed into trade unions, both in Europe and the United States.

Guilford, *Gil' ferd,* or **Guilford Courthouse, Battle of,** one of the most stubborn battles of the Revolutionary War, fought 30 m. from the Virginia border, March 15, 1781. The Americans were under Greene, whom Morgan's forces had joined, and the British were commanded by Cornwallis. From the first the British had the advantage and a rout of the Americans was with difficulty prevented. The English lost 600 men, the Americans about 400. Greene's generalship turned into a strategic triumph what military critics declare was an American defeat. His heavy losses made Cornwallis retreat to Wilmington, abandoning the interior of the state, which he had been struggling for months to possess.

Guillemot, *Gil' e mot,* or **Sea Pigeon,** birds related to the auks and puffins, having a short, slender, straight bill and webbed feet. These birds are 12 to 15 inches in length and the plumage is usually black with some white markings, in the spring, and variegated black and white in the fall. The feet are bright red in the summer and pink in the winter. The nest is made in a depression in the rocks near the water and two eggs are laid by some species. The common guillemot is found on both sides of the Atlantic Ocean, while the pigeon guillemot is abundant on the Pacific coast of America and in northern Japan.

Guillotine, *Gil' o teen,* an instrument for beheading persons. It was invented in the Middle Ages, and when Dr. Guillotine, for whom it was named, proposed its adoption in France during the French Revolution, the National Assem-

bly voted in favor of it. It has a steel blade loaded with lead, which slides up and down the inner grooves of two perpendicular posts. The prisoner's neck is held below in a round hole between two planks and is severed by one blow.

Guilmant, *Geel" mahng',* **Félix Alexandre** (1837-1911), an eminent French composer and organist, born at Boulogne. After holding several important positions as organist he was appointed chief organist at La Trinité, Paris, remaining in this position nearly 30 years. As a virtuoso and composer he held first rank among organists of his generation. His compositions include organ sonatas, Christmas carols and many books or shorter organ compositions.

Guinea, *Gin' y,* an English gold coin in use between 1663 and 1813. It derived its name from the fact that it was first made from gold mined in Guinea. It was designed to be worth 20 shillings, but was never worth less than 21 shillings and was finally made legally to equal the latter. Its value is $5.11 in currency of the United States.

Guinea Fowl, a bird related to the pheasants and native in West Africa and the Cape Verde Islands. It is about the size of a small domestic fowl, and is usually bluish-gray, spotted or speckled with white. The neck is purplish and the head is yellow and red. There is a hard protuberance, or casque, on top of the head. The nest is made on the ground and upwards of 17 eggs are laid. In Africa these birds live in flocks of considerable size, and roost upon trees at night, at which time their noise is almost deafening. The guinea fowl has been domesticated and thrives well under these conditions.

Guinea, Gulf of, a body of water on the western coast of Africa, a portion of the Atlantic Ocean. It lies between capes Lopez and Palmas, along the shores of Upper Guinea. The bights of Biafra and Benin are here, and also Prince's, Po and St. Thomas islands.

Guinea Pig, an interesting South American member of the Cavy Family, first domesticated by the Peruvians and now known throughout the United States. It has a plump, short-haired body, short legs and an inquisitive face. Many varieties are reared, mostly black, white or tawny in color. They are extensively used in bacteriological experiments.

Guise, *Gu eez',* a ducal house of France, and a branch of the Lorraine family. The Guises became politically important under Francis II, as his wife, Mary, Queen of Scots, was the niece of the Duke of Guise. The most important was François of Lorraine, Duke of Guise, who defended Metz successfully against Charles V and was the real ruler of France under Henry II and Francis II. Henry, his son, succeeded François as leader of the Catholic Party. He defeated the allies of the Huguenots, but his popularity aroused the fear of Henry III, who forbade him to enter Paris. After the Duke had entered, Henry III invited him to a conference and had him assassinated.

Guitar, *Git ar',* a box-shaped musical instrument, made of wood, with a neck arrangement similar to that of the violin. Of its six strings, three are treble and made of catgut, and three are bass and are made of silk wound with wire. The instrument is played upon by plucking the strings with the fingers, the pitch being regulated by placing the fingers of the left hand on a series of metal frets along the neck. See VIOLIN.

Guizot, *Ge"zo',* **François Pierre Guillaume** (1787-1874), a French historian and statesman, born at Nîmes, France, and educated at Geneva. In 1809 he wrote a review of Chateaubriand's *Martyrs,* which was well received, and in 1812 he became professor of modern history at Sorbonne College, University of France. In 1814 Guizot was made secretary-general of two ministries; in 1819, director-general of commons and departments of the ministry of the interior. In 1820 he lost his offices because of his political opinions, but he was restored to his chair and to the council of state in 1828. In 1840 he was sent as ambassador to London and the

same year became minister of foreign affairs. In 1847 he became official head of the cabinet. On the fall of Louis Philippe in 1848 Guizot escaped to London, but returned to Paris in 1849. Among his writings are *History of Civilization in France, General History of Civilization in Europe, History of the English Revolution* and a life of Washington.

Gulf Stream, the principal current of the Atlantic Ocean. It takes its name from the Gulf of Mexico, from which it flows northward, passing between Florida and the Bahama Islands. The stream has its origin in deep currents far to the east of the Windward and Leeward islands. At its narrowest part it is about 50 m. in width. Its depth is about 2000 ft., and it flows at an average rate of about 2 or 3 m. an hour, in some localities reaching a velocity of 5 or 6 m. an hour. It moves in a northeastwardly direction along the coast of North America, and, between 30° and 35° north, separates into several small streams about 600 ft. in depth. North of this the stream is further broken up by the westerly winds and becomes a mere drift flowing in a northeasterly direction toward northern Europe. The current is several degrees warmer than the remainder of the ocean through which it flows, in the same latitude, and in consequence the climate of the British Isles is greatly tempered by the drifts which flow past their shores.

The Gulf Stream is generally supposed to be the result of the general vertical circulation of the ocean started by the creeping of the polar waters along the ocean bed toward the equator. The equatorial waters are forced upward by this deep-sea current and move northward to replace the perpetually sinking waters at the poles. Deviation to the east in the flow of the current is due to the rotating movement of the earth. See CURRENTS, MARINE.

Gulf'port", Miss., a city and port of entry of Harrison Co., 13 m. s.w. of Biloxi, on the Gulf of Mexico and on the Louisville & Nashville and the Gulf & Ship Island railroads. The city has the best harbors on the entire Gulf coast, and is the port of entry for the Pearl River customs district. In 1901 the Federal Government and the Gulf & Ship Island Railroad Company dredged a navigable channel for coasting vessels which greatly promoted the trade of

GULL

Gulfport. During the last decade the town has grown from a small seacoast village to a thriving city, and contains canning industries, lumber and cotton mills, machine shops, woodworking plants, foundries and manufactories of cotton-seed oil, fertilizers and other diversified products. Prominent among the public buildings are the courthouse, post office, banks and Great Southern Hotel, one of the finest in the South. Population in 1920, 8,157.

GULL'S HEAD AND FOOT

Gull, a name applied to many sea and lake birds with heavy bodies, short legs, partly-webbed feet and a more or less hooked bill. They have long, pointed wings and are birds of powerful flight. A number of different species are known.

HERRING GULL, perhaps the most common and best-known species. This bird is over two feet in length, with pearl-gray back and white under parts, the five outer primary feathers of the

wing being black with white tips. The bill is yellow with a red spot near the end of the lower mandible. In winter the plumage of the head and neck is streaked with gray. The nest is placed on the ground, on rocks or in trees, and is made of grass, earth, seaweed, etc. It contains three eggs spotted with brown or lilac. The herring gulls live on both sides of the American continent and on the Great Lakes. On the ocean they follow the schools of herring and other small fish, upon which they feed. On the Great Lakes they follow steamers to feed upon the refuse thrown overboard.

Gum, a compound of carbon, hydrogen, and oxygen which occurs in nearly all plants and oozes from their stems or fruit. Gums differ from resins in being capable of being dissolved in water but not in alcohol. They are generally odorless and tasteless. Our commonest varieties are cherry-gum and gum mesquite. Other familiar gums are: gum arabic, which is used in the manufacture of medicines, candy and paste and also to give *finish* to silk and other cloth fabrics; gum tragacanth, used in medicines and glue; and gum acacia, also used in medicines.

Gum Arabic, *Ar' a bik,* a reddish, sometimes yellowish, gum obtained from acacia trees that grow in Asia and northern Africa. It is used for a large variety of purposes, principally in making mucilage and pastes. See ACACIA; MUCILAGE.

Gum Resin, a name given to the thickened, milky juices of plants, made up of gum, which is soluble in water; resin, which is soluble in alcohol; and some mineral and vegetable substances. Gum resins are prepared as powders or dissolved in diluted alcohol and used medicinally. The best-known gum resins are gamboge, myrrh, asafetida and scammony.

Gunboat, a small war vessel armed generally with one large gun. This gun is sometimes mounted on a pivot on the deck of the vessel, and can be turned in any direction; and sometimes it is mounted on a platform that is raised and lowered from hold to deck and back by machinery. The gunboat is used chiefly for coast and river defense. In 1860 the United States had about 250 of these vessels, and they rendered good service during the Civil War; but their use has been practically discontinued.

Guncotton, or **Pyrox'ylin,** a highly explosive compound prepared by the action of nitric acid on the fibers of cotton. It is used in the making of collodion, varnishes and celluloid. Military guncotton is very explosive and is used by the United States navy in torpedoes. It is compressed into blocks of about three inches in diameter and two inches high, with half-inch holes in them. A form of guncotton called pyrocellulose is employed in making smokeless powder. See COLLODION; CELLULOID; VARNISH; SMOKELESS POWDER; TORPEDO.

Gunpowder, a well-known explosive mixture consisting of saltpeter, charcoal and sulphur. The proportions of these materials vary according to the kind of powder desired. The origin and early history of gunpowder is obscure, but its invention is generally attributed to the Chinese, who used it before the Christian Era. It was known in Europe in the 13th century, but it did not come into general use for warfare until the 16th century. The materials used in making gunpowder are first refined and purified and then ground very fine, and for the most common grades are mixed in revolving cylinders in the following proportions: 75 per cent of saltpeter, 15 per cent of charcoal and 10 per cent of sulphur. They are mixed wet and worked into a cake called a mill cake, which is afterwards crushed into meal. This meal is then pressed into cakes by hydraulic pressure, the degree of which depends upon the strength of the powder desired. These cakes are again crushed by means of a machine having toothed rollers, which break up the mass and reduce it to grains of various sizes, which are sorted by screens. Afterwards, the powder is put through a revolving, wooden barrel, whereby it is polished, graphite being added for the purpose of produc-

ing the glaze so commonly seen on that used in firearms. Finally it is conveyed to drying rooms preparatory to being packed in kegs for shipment. See GREEK FIRE; GUNCOTTON; SMOKELESS POWDER.

Gunpowder Plot, a plan for destroying King James I and the members of Parliament on Nov. 5, 1605. The King had disappointed the Catholics because of his severity in enforcing the penal laws, and a few of the most desperate banded together to overthrow the government. They secured the cooperation of a fearless soldier, Guy Fawkes, and a Thomas Percy. They discovered a cellar beneath the House of Lords, and stored in it several barrels of gunpowder. Several other plotters were added to their band, and Fawkes was selected to set fire to the gunpowder on the assembling of Parliament, Nov. 5. Betrayed by the indiscretion of one of the band, Fawkes was arrested early in the morning of the fifth, as he was emerging from the cellar. Many of the conspirators were killed on being taken and several died with Fawkes on the scaffold.

Gunsaul'us, Frank Wakeley (1856-1921), a distinguished American clergyman, born at Chesterville, Ohio. He was educated at Ohio Wesleyan University and at Beloit College, Wisconsin. Beginning as a Methodist minister in 1875, he entered the Congregational ministry four years later. Since 1899 he has been pastor of the Central Church, Chicago, an independent organization, and in this capacity has attained a wide following. His lectures upon Savonarola, John Hampden and other subjects have added to his popularity. Dr. Gunsaulus became president of Armour Institute (Chicago) in 1893, and is the author of several publications. Among his works are *Monk and Knight, Phidias, Gladstone* and *Paths to Power.*

Gusta'vus I, or **Gustavus Vasa** (1496-1560), King of Sweden from 1523 until his death, was born at Lindholm. At this time the three Scandinavian kingdoms, Denmark, Norway and Sweden, were united, and the Swedish people were divided in their allegiance, some favoring more national power for Sweden and others upholding the Danish authority. Sten Sture, the cousin of Gustavus, was one of the former, and through his executive ability had been proclaimed administrator of Sweden. To his court the youthful Gustavus was sent. He took part in the Battle of Brännkyrka, in which the Swedish forces defeated Christian II of Denmark, and later was sent with five other youths of the court as hostage to the Danish court. Here he was treacherously kept prisoner by the King, who said, "There is many a Sten Sture in the lad."

Escaping from his imprisonment, Gustavus wandered as an outcast until the news of the Swedish massacre, in which his father and uncle lost their lives, and of the price set upon his own head determined him to strike a final blow for the freedom of Sweden. By his own efforts and with courage that faced disappointment, privation and treachery, he aroused the hardy Dalecarlian peasants to a revolt which released the country from Danish tyranny and placed Gustavus himself upon the throne of Sweden. He was crowned in 1523, and during a long reign of 37 years was untiring in his efforts to develop the nationalism of his country. His son Eric succeeded him on the Swedish throne.

Gustavus V (1858-), King of Sweden, successor of King Oscar II. He studied at the University of Upsala and in 1875 he entered the army, where he attained the rank of general in 1898. From 1884 to 1891 he was Vice-King of Norway, and his efforts to maintain the union of Norway and Sweden made him greatly disliked by the Norwegian Radicals. In 1881 he married Princess Victoria, the daughter of the Grand Duke of Bavaria. He succeeded his father as King of Sweden in 1907.

Gustavus Adolphus (1594-1632), King of Sweden and successor of Charles IX. He conciliated the nobles who had

been alienated by his father's harshness, protected the lower classes from the oppression of the landowners and reorganized the government. He also built new towns and encouraged commerce. He terminated his war with the Danes with honor in 1613, and in 1617 by the Treaty of Stolbova gained Carelia and Ingria. From Poland he won Livonia, Esthonia and Courland in 1629. In 1630, during the Thirty Years' War, he went to the relief of the Protestants in Germany. In 1631 Gustavus defeated the Germans at the Battle of Breitenfeld. The next year he defeated them again under Wallenstein at Lützen, but fell on the battlefield. His conquests had a lasting influence. See THIRTY YEARS' WAR.

Gutenberg, *Goo' ten berk,* **Johannes** (about 1398-1468), the inventor of printing with movable type, born in Mainz, Germany. The documents referring to his early life are obscure and tell very little that may be accepted as authentic. His name Gutenberg was assumed from the name of his mother's birthplace, the city of Gutenberg. His first inventions were along a variety of lines, including a method of polishing stones and a new way of making mirrors. Both business ventures connected with these inventions turned out disastrously, and Gutenberg next appears about 1450 in partnership with Johann Fust, a wealthy goldsmith; Fust was to furnish the money and Gutenberg the "tools" for a new printing device. The types were cast, the office opened and the first book, a large Latin Bible, printed, when the partners disagreed. The printing of the Bible had taken five years and Fust saw no returns for his investment, so he brought suit against Gutenberg, secured control of the plant and carried on the business with a new partner. Gutenberg, however, was aided to secure another press and continued his work until his death. Books believed to have been printed by him are now very costly, but Gutenberg died poor and friendless and almost unknown. A fine bronze monument has been erected to his memory in Mainz. See PRINTING.

Guth'rie, Okla., the county seat of Logan Co., located in the central part of the state, on Cottonwood Creek not far from its juncture with the Cimarron River. It is 32 m. n. of Oklahoma City and 450 m. s.w. of St. Louis, on the Atchison, Topeka & Santa Fe, the Chicago, Rock Island & Pacific, the Missouri, Kansas & Texas and other railroads. It is a city that has grown rapidly, but has been well planned. Its most interesting public buildings are the old capitol, city hall, the Federal Building, a Masonic Temple and a Methodist hospital. Guthrie is one of the seats of the Federal courts, and its cotton gins, foundries and machine shops attract trade from the surrounding country. Cottonseed oil, lumber, brooms, flour, cigars and furniture are manufactured. The city has a large convent and a flourishing business college. Population in 1920, 11,757.

Gut'ta-Per'cha, a substance found in the so-called milk sap of various trees of the Nettle, Spurge and Sapodilla families. It occurs in the form of tiny, translucent globules suspended in the watery sap, and gives to the sap its milky appearance. It is supposed to assist in protecting plants against wounds. At ordinary temperatures gutta-percha is hard and resembles India rubber, though it is not elastic.

Gutta-percha is obtained by cutting down the trees, stripping the bark and allowing the white, thick sap to run into troughs. After exposure to the air a light, thick cream rises and the entire liquid darkens. The cream is made into cakes which are merely boiled in water before being ready for shipment. It is shipped in blocks of from five to ten pounds each and is put to innumerable uses, such as the making of flexible hose, bottles, surgeons' splints, temporary filling for teeth, molds, golf balls, insulating material, etc. Gutta-percha and India rubber are often confused through the similarity of their uses, but they differ mainly in the fact that India rubber is very elastic, while gutta-percha, though extensible, is inelastic.

Guyot, *Ge' yo,* **Arnold** (1807-1884), a Swiss-American geologist and physicist, born near Neuchâtel, Switzerland. He became professor of history and physical geography at Neuchâtel in 1839. In 1848 he came to the United States, where he lectured in Boston, his lectures later appearing as *Earth and Man,* a textbook on physical geography. In 1855 he became professor of geology and physical geography at Princeton, where he established the museum. For preparing a series of geographies and wall maps, he was honored by the Vienna Exposition of 1873. His publications include, besides biographies of Carl Ritter, James H. Coffin and Louis Agassiz, *A Treatise on Physical Geography* and *Creation, or the Bible Cosmogony in the Light of Modern Science.*

Gymnas'tics, exercises by which the physical, and particularly the muscular, powers are developed, usually indoors and by the use of various machines and appliances, each of which has been scientifically designed to strengthen a particular muscle or set of muscles. These are of special value in making it possible for one to overcome physical defects, so that an inherited weakness, or one developed during childhood, shall not continue into maturity and prevent the maximum of physical efficiency.

Gymnastic exercises are of most value between the ages of 12 and 35. But they should be taken under expert direction; and, in no case, can the undue development of any portion of the body or the use of very heavy weights, or exhausting exercises, be considered advisable. Too often these result in the straining of some muscle or ligament, or in injury to the heart action. Because the gymnasium is seldom a well-ventilated building, out-of-door exercises are usually preferable; while the zest which is found in clean, wholesome sports is of greater recreative value than any mechanical exercise can be. The gymnasium, however, has its function, and the value of properly directed gymnastic exercise should not be ignored nor underestimated.

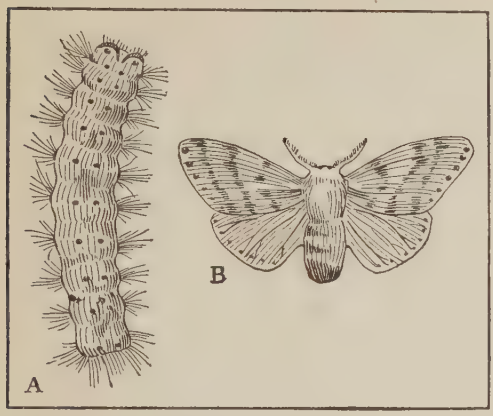
Gymnosperm, *Jim' no sperm,* the smaller of the two great divisions of seed-producing plants, whose members are distinguished as not having their undeveloped seeds enclosed in a case. The flowers are always imperfect, that is, lacking one of the essential parts necessary to the production of the seeds, and are also always without calyx and corolla. Gymnosperms are always trees or shrubs with needle-shaped, or, at least, very narrow, leaves. Members of the Pine Family are typical of this class. See ANGIOSPERM.

Gypsum, *Jip' sum,* a calcium sulphate which occurs in great abundance in various parts of the earth. It is colorless and white, and forms in prismatic or tubular crystals. When it occurs in the form of transparent crystals it is termed selenite; when the formation is fibrous, with fibers extending parallel to one another and at right angles to the direction of the vein, and the polished surface presents a pearly appearance, it is called satin spar. Alabaster is a form of translucent gypsum, granular like marble and colored pink, gray or yellow. Rock gypsum, the ordinary gypsum of commerce, occurs in large beds of massive rock, frequently mixed with clay, calcium carbonate and other impurities. It is often accompanied by rock salt. Gypsum when heated to a high temperature is reduced to powder. From this powder plaster of Paris is made. It takes its name from Paris, France, near which large quantities of gypsum are found. Aside from its use in the manufacture of plaster, gypsum is employed for cementing purposes, in the manufacture of stucco work and imitation marble, porcelain and glass, as a filler for paper, a basis for paints and a fertilizer of soils. It is found in Canada, the United States, Austria, Germany, France and Arabia. See ALABASTER.

Gypsy, *Jip' sy,* a nation of wandering people supposed to have come originally from India. Their language, customs and physical characteristics distinguish them from all other nationalities, although their nomadic, unsettled life has

brought them into contact with all races of people. They are a finely-built race, with clear olive skins, glossy black hair, bright black eyes, red lips and white, regular teeth. Probably less than 500,000 now remain.

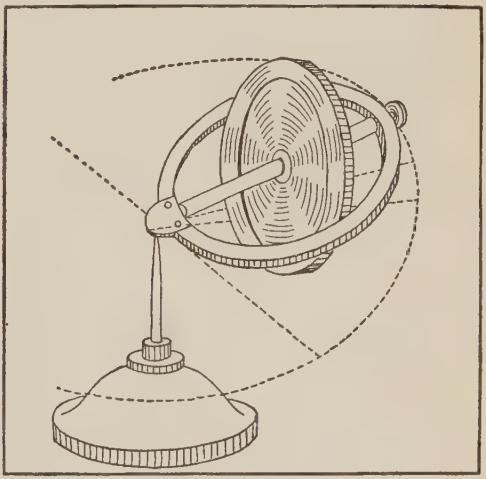
Gypsy Moth, a moth of the Tussock Moth Family, whose caterpillar is extremely destructive to trees. The male moth is bluish-yellow in color and very active; the female is white, with dark irregular spots, and is rarely on the wing. The eggs are laid in masses upon the limbs and trunks of trees, the sides of houses and on fences. These hatch into long, blue-gray caterpillars, which, when mature, are about three inches in length and are marked with two rows of black and two rows of red spots. In the illustration A represents the caterpillar, and B the moth. This moth migrates only during the caterpillar stage and is then carried on passing wagons, carriages and trains; thus it is not readily spread, but tends to infest thickly certain neighborhoods. The eggs may be destroyed by touching with a mixture of creosote oil, 50 per cent; carbolic acid, 20 per cent; turpentine, 20 per cent; coal tar, 10 per cent. The caterpillars may be killed with the usual poison sprays, which must be used in stronger solutions for the old than for the young. Strips of burlap tied about the tree are effective, for the caterpillars feed only by night, and by day will crawl beneath the burlap; from thence they may be easily collected and disposed of. See INSECTICIDE.



GYPSY MOTH

Gyrfalcon, *Jur' fo k'n,* or **Gerfalcon,** a bird of the Hawk and Eagle Family, about two feet in length. The plumage is barred and streaked white and gray; the under parts are marked with slate; the tail is banded. The nest is made on high, rocky cliffs, is composed of sticks and is usually lined with seaweed and sea moss. The eggs are spotted with brown. The gyrfalcons are rapid flyers and tireless hunters, fiercely pursuing sea birds on the coast or land birds in the fields.

Gyroscope, *Ji' ro skope,* an instrument used to illustrate the motions of rotating bodies. It consists of a wheel, accurately balanced, freely rotating and fixed upon an axis which in turn is mounted in a ring. One point of this ring has a small socket, into which the point of the supporting standard is inserted. When the wheel is set in rapid motion by means of a string wound about the axis, the instrument balances and moves in apparent defiance of the laws of gravitation. These motions are due to resistance to the change of direction of the axis of the rotating wheel. The gyroscope is used as a balancing or steadying device in certain models of aeroplanes and in a monorail transportation system. Children's tops are one form of gyroscope. See TOP.


GYROSCOPE

H

HAAKON, *Haw' kon,* the name of several kings of Norway. The earliest of them, Haakon the Good, spent his youth in the court of King Athelstan of England, who brought him up according to Christian beliefs. At his father's death in 933, he wrested the throne from his brother, Eric, and unsuccessfully tried to introduce Christianity into Norway. Haakon IV, surnamed the Old, ruled from 1217 to 1263, and added Iceland and Greenland to the Norwegian realm. Haakon VI came to the throne while a child, in 1343, his father having been compelled to resign and serve as regent during his minority. See HAAKON VII.

Haakon VII (1872-), King of Norway and second son of King Frederick of Denmark. He entered the Norwegian navy in 1886 and became familiar with all kinds of vessels. In 1896 he married Princess Maud, the youngest daughter of Edward VII, and in 1905, when Norway and Sweden were separated and the Government of Norway offered him the crown, he accepted on condition that the choice be approved by the people. In November, 1905, the people expressed their approval by a large majority, and a few days later he became king.

Habak'kuk, a book of the Old Testament, the author of which, Habakkuk, flourished about 600 B. C., during the reign of Jehoiakim, King of Judah. Habakkuk was the eighth of the minor Hebrew prophets and belonged to the tribe of Levi. The book of *Habakkuk* consists of two parts. The first part contains a dialogue between the prophet and God, in which is foretold the destruction of the Babylonian Empire; the second part is a majestic song of prayer and praise, expressing the prophet's confidence in the justice and mercy of Jehovah.

Habeas Corpus, *Ha' be as Kor' pus,* an ancient English writ addressed to him who has another in custody, and commanding him to produce the body of the person named at a certain time and place. In other words, it is a "writ of right" brought into use for better securing the liberty of British subjects. This act, passed in 1679, and next in importance in England to the Magna Charta, provided that if any person were imprisoned by order of any court or of the king, he might demand a writ to bring him before the King's Bench, which should determine whether the commitment was just.

In the United States Constitution there is a provision that "the privilege of the writ of *habeas corpus* shall not be suspended, unless when in cases of rebellion or invasion the public safety demands it." Congress may, by majority vote, suspend the writ and the same action may be taken by a state Legislature. Either the person in custody, or another acting for him, may demand the writ, which must be accompanied by an affidavit declaring that the detention is, in the opinion of the applicant, contrary to law, and also clearly setting forth all the facts as they have been established.

Hab'it, an act of mind or body which is performed automatically, and, on some occasions at least, unconsciously. Habits are acquired, supposedly, because it is always easier for the nervous system to act as it has once acted than in an entirely different manner; and easiest for it to act as it has on many occasions. This is explained upon the theory that when a current of nerve force passes along a nerve tract it "blazes a trail" which similar currents may thus more easily follow; and that, the more frequently such a current travels a particular route, the easier this route becomes; until, ultimately, one performs

even complicated actions, such as walking, quite unconsciously, so far as their details are concerned. Thus habit may be said to free the mind from the necessity of giving constant attention to details that are unimportant when once properly mastered; and has made possible not only those achievements already recorded, but a host of others which are certain to be attained when man learns to use his powers more completely.

But, just as the bones lose their cartilaginous character with the passage of youth, so the plastic condition of the nervous system is gradually lost as childhood passes into youth and youth into maturity. Moreover, as this occurs, it becomes increasingly difficult for the nerve current to force its way along nerve tracts not previously developed, but easier and easier for it to traverse those routes along which it has frequently passed. For this reason it is difficult for a mature animal, or person, to change habits. The man or woman who was not in childhood trained to tell the truth, to play the violin, to think before acting, to control his temper in times of emergency or to speak a foreign language, cannot easily be trained to do these things when he is older. The man who bites his finger nails, eats with his knife, uses language for which he would offer a thousand apologies, or otherwise offends those whose esteem he craves, is by no means always ignorant of the rules of propriety; but is very commonly the victim of habits acquired in youth which are still occasionally victorious over those of later years.

The expert horseman knows by experience, if not from books, the importance of habit. With him it is purely a question of business. He may let some inexperienced person drive one of his oldest horses. If short of money, he may employ cheaper men to exercise his older track animals. But his thoroughbred and high-priced colts always and everywhere receive the attention of those most competent both to prevent the development of bad habits and to strengthen desirable habits.

Men are now coming to really appreciate the wisdom, the economic and social importance of applying toward the development of their children those very principles which so long have determined the financial success of the horseman. Because it will cost years of effort and a tremendous waste of energy to overcome but partially the habit of slovenly speech and imperfect articulation, the child that is just beginning to talk must not be left in the care of those who mumble, rather than articulate, or who do not know that they might better talk "baby-talk" anywhere else than in the presence of the baby. The kindergarten performs no more important service than in training little children to habits that will be helpful throughout life. The activities of the primary school, the organized play and manual training of the grammar and high schools and all the varied tasks of youth which are truly efficient agencies for education, have been proved valuable largely because of the habits that they originate or strengthen. "A well-trained nervous system is the greatest friend that the mind can have. An ill-trained nervous system is a relentless enemy to the highest mental powers." See KINDERGARTEN; MANUAL TRAINING; DOMESTIC SCIENCE; EDUCATION.

Hack'berry, a small Southern tree of the Nettle Family, growing in rich, low ground. The leaves are much like those of the elm, to which it is related, but are more tapering and sometimes have smooth margins. The flowers are of two kinds: the upper ones, which grow singly on long slender stems proceeding from the leaf joints, are the fruit-bearing blossoms, and are said to be pistillate; the lower ones grow in short-stemmed clusters, and because they contain the stamens with the fertilizing dust, they are said to be staminate. Both kinds are light green in color and rather inconspicuous. The fruit is a sweet little berry about the size of a currant and edible; it ripens early in the autumn. There are several varieties of the hackberry, variously known as lotus berry and nettle tree.

Hack'ensack, N. J., county seat of Bergen Co., 12 m. n. of New York City and 14 m. from Jersey City, on the Hackensack River and on the Ontario & Western and the New York, Susquehanna & Western railroads. The city is attractively located above the Hackensack Meadows, or salt marshes, and contains many fine public buildings, an old ladies' home, hospital, library, etc. Hackensack was settled by the Dutch in 1640. The city has manufactories of wall paper, silk, carriages and jewelry. It was incorporated in 1868. Population in 1920, U. S. Census, 17,667.

Had'dock, a favorite food fish of the Cod Family. It is found in restricted localities from Iceland to France, but is always abundant on the Massachusetts coast and in the streams tributary to the Gulf of St. Lawrence. In color the haddock is blue-gray above and lighter below and has a light-colored, plainly-marked lateral line. There are three dorsal fins, all of good size, and a small sensitive feeler, called a barbel, upon its chin. The average weight of the haddock is three or four pounds. It is an excellent food fish and is sold fresh, preserved, smoked, salted or dried. The Jerusalem haddock is a member of the Mariposa Family, and the Norway haddock is a member of the Rockfish Family.

Hades, *Ha' deez,* in classic mythology a place near the center of the earth, for departed souls. It consisted of Elysium for the good and Tartarus for the evil. According to Homer, it was merely one region where all souls, barring those of mortals who had personally wronged the gods, busied themselves, in mimicry, with their occupations of earth.

Had'ley, Arthur Twining (1856-), an American educator, born at New Haven, and educated at Yale and Berlin. In 1886 he was made professor of political science at Yale; and in 1899, president. He served as commissioner of labor statistics for Connecticut from 1885 to 1887, and is known both as a man of affairs and as a scholar. His *Railroad Transportation: Its History and Laws* is recognized as authoritative and has been translated into several foreign languages. He also wrote *Economics: an Account of the Relations Between Private Property and Public Welfare, Report on the Labor Question* and *The Education of the American Citizen.*

Ha'drian (76-138), a Roman emperor, successor of Trajan in 117. He quelled several insurrections, concluded a peace with the Parthians, induced the Roxolani to withdraw from Mœsia, reformed the army and fortified the frontiers. He erected many fine buildings and public works in the provinces and built a wall in Britain from Solway to the Tyne. As a civil ruler he showed great ability. He was also a lover of literature and philosophy.

Hæmoglobin, *He" mo glo' bin.* See BLOOD.

Ha'gerstown, Md., a city and the county seat of Washington Co., 117 m. n.w. of Baltimore, on the Baltimore & Ohio, the Norfolk & Western, the Cumberland Valley, the Western Maryland and other railroads. It is an important commercial center. Among the activities of the town are the manufacturing of silk, cigars, furniture, automobiles, matches, flour, ice, fertilizer, spokes and bicycles. Of no less importance is the operating of machine and railway shops, knitting mills, bending works and pipe-organ factories. Here are located Kee Mar College for women, and the Washington County Free Library. Hagerstown was settled about 1740. It was an important base of operations during the Civil War. Population in 1920, U. S. Census, 28,064.

Haggai, *Hag' a i,* a book of the Old Testament, the author of which, Haggai, was one of the 12 minor Hebrew prophets and the first to prophesy after the Captivity. Accompanying Zerubbabel to Jerusalem for the purpose of rebuilding the Temple, Haggai was inspired by God to rouse the people to support their leader, after a long period of lethargy and discouragement. The book of *Haggai* contains four distinct prophecies, two in the first chapter and two in the sec-

ond. At the close there is a prediction of the establishment of the Kingdom of God midst the ruin of temporal kingdoms. See BIBLE, subhead *The Old Testament.*

Hag'gard, Sir Henry Rider (1856-), an English novelist, born in Norfolk. He was made private secretary to Sir Henry Bulwer, governor of Natal, South Africa, at the age of 19, and was later master of the High Court in the Transvaal. Upon his return to England he practiced law and wrote fiction that was popular, but possessed little enduring merit. After 1895 he retired to his estate in Norfolk and became a practical farmer and gardener. He made a study of rural conditions in England and of Salvation Army settlements in California and Colorado, and reported on these investigations in his works *Rural England, The Poor and the Land* and *Report on the Salvation Army Colonies.* He was knighted in 1911. His works of fiction include *King Solomon's Mines, Dawn, She, The Brethren, The Heart of the World* and *Ayesha, or the Return of She.*

Hague, *Hage,* **The,** the capital of Netherlands, situated in the Province of South Holland, about 3 m. from the North Sea and about 15 m. from Rotterdam. As the chief town of the province, the residence of the sovereign and the seat of the government, it is a handsome and fashionable "half-Dutch, half-French" city. The principal edifices include the medieval government buildings, the picturesque town hall, the Groote Kerk, or Church of St. James, the palace of justice, the Gevangenpoort, or the prison gatehouse, the Binnenhof, the Buitenhof, the royal palace, the old hall of the knights, the municipal museum and several hospitals, theaters and schools. The Mauritshuis contains the famous picture gallery with its treasures by Rembrandt, Ruysdael, Rubens and others. The royal library is large and very valuable.

The industries of the city are not important. The Hague is preeminently a fashionable residential city, depending for its life and activity on the court and nobility, as well as on the tourists that throng it in large numbers. A great number of treaties and conventions have been signed here. The first "Hague Convention" assembled at The Hague, and in 1899 The Hague Tribunal, or International Court of Arbitration, was established. Andrew Carnegie contributed $1,500,000 toward the cost of a Palace of Peace which, as the seat of the tribunal, was to be completed in 1913. During the thirteenth century The Hague was a hunting lodge of the counts of Holland. It became a princely residence under William II in 1250, and prospered greatly, being the seat of the States-General and of the stadtholder of Holland, and by the seventeenth century the diplomatic capital of Europe. Population in 1905, 242,054. See PEACE CONFERENCE, INTERNATIONAL.

Hah'nemann, Samuel Christian Friedrich (1755-1843), founder of the homeopathic school of medicine, born at Meissen, Saxony. He studied at the "elector's school" at Meissen, and later took his courses in medicine in Leipsic, Vienna and Erlangen. In translating Cullen's *Materia Medica,* he was led to make some experiments upon himself that led him to the conviction that the cure of a disease was the drug that would cause the disease in a well person. He also decided that the doses usually administered were too large. His life was from this time on given to perfecting and making public his system. See HOMEOPATHY.

Haidarabad, *Hi" dar ah bahd'.* See HYDERABAD.

Hail, lumps of ice of various sizes which fall in showers either before or during the progress of a storm of wind and rain. The masses of ice are usually irregular in form, being rounded, pyramidal or star-shaped. In size they range from fine grains to lumps of a pound or more in weight. When the masses of ice attain a diameter of a quarter of an inch or greater, they are called hailstones. Stones weighing from 12 to 16 ounces fall annually in America, Europe

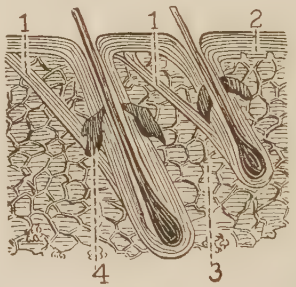
and India; the largest of which there is record weighed as much as two pounds. There are various theories which attempt to explain the formation of hail. If the larger stones are closely examined, they are found to be formed around a nucleus of some foreign substance, such as a grain of sand or a pebble, and consisting of alternating coatings of ice. When a rising volume of air cools to a certain point, it begins to form a cloud. Above this it reaches a temperature where hail is formed. With the movement of the upper air currents, these clouds of moisture are apt to make a series of ascents and descents, in the course of which the ice particles become covered with layers of ice or snow, which form in alternating layers, like the layers of an onion. The large and destructive hailstones frequently fall during local thunderstorms and tornadoes.

Hail Columbia. See HYMNS, NATIONAL.

Hainan, *Hī' nahn'*, an island in the China Sea, separated from the mainland by Hainan Strait, 10 m. in width. It has an area of 13,600 sq. m. and forms a department of the Chinese Province of Kwangtung. In the interior are numerous wooded mountain chains, and the chief products of the fertile soil are coconuts, cotton, sugar cane and tobacco. The capital is the treaty port of Kiungchow, and the population is estimated at 2,500,000.

Hair, a part of the protective covering of Mammals. It is variously distributed over the body and corresponds with the feathers of birds, scales of fishes and of reptiles. It takes the form of wool and fur or bristles and quills, and presents variations of color equally diverse. Because of the delicate structure and important function of the brain, the human head is abundantly supplied with hair to cover necessarily exposed or thinly covered parts.

In the illustration, 1 is the skin; 2, the subcutaneous tissue; 3, the muscles of the hair follicle; and 4, the sebaceous gland. Each hair of the human head springs from a depression in the skin, called the hair follicle. It consists of a stem and a bulb-shaped root, which rests upon a minute elevation, or papilla, of the skin at the lower end of the follicle. A hair is made up of a number of elongated epidermic cells united to form fibers. These cells multiply rapidly in the papilla and, pushing upward, force along the older cells. It is in this manner that hair grows. If the reproductive organ at the base of the root be destroyed, as is often the case when hair is pulled out, growth is no longer possible. Death of all the papillæ of the head, often caused by poor circulation of the blood in the scalp, results in baldness. Extending from the side of each hair follicle to the skin surface is a slender bundle of unstriped muscle, its oblong direction causing the hair to lie close to the head. Emptying into the follicle are sebaceous, or oil, glands, one or more to each follicle, which lubricate and soften the hair.



HAIR

Hair is an important article of commerce, sheep's wool being the most valuable. The hair of camels, goats and alpacas is used in combination with cotton and wool in the manufacture of dress fabrics. Hog bristles are used for making hair brushes, while the fine brushes of painters are made from the hair of sable and marten. Hair used for making wigs comes largely from the heads of European peasants.

Hairworm, a family of threadlike animals usually called worms, but scientifically named Nematodes. They are distinguished by their great length and are sometimes found in ditches by the roadside, where children say that they have developed from the horsehairs which they greatly resemble. Hairworms, however, generally live as para-

sites in the bodies of insects; they require a great deal of moisture and when this is lacking they dry up and become apparently lifeless, though they readily revive if moistened.

Haiti, *Ha' ty,* or **Hayti,** the second largest island of the West Indies, lying 50 m. s.e. of Cuba, from which it is separated by the Windward Passage. Haiti is nearly 400 m. in length and has an area of 29,000 sq. m., or about the same as that of South Carolina. The island is mountainous, but luxuriant; almost impassable forests cover its ruggedness and make the island one of the most beautiful of the group. The chief rivers rise in these mountains and form rapidly-flowing outlets to the sea. The climate is tropical, and in the lowlands it is apt to be unhealthful to Europeans. Destructive hurricanes are frequent. The soil is fertile and yields excellent returns. Silver, platinum, tin, antimony, iron and rock salt occur on the island, but are not mined in great quantity. The chief exports are mahogany, logwood, coffee, cotton, tobacco, cocoa and sugar.

Haiti was discovered by Columbus in 1492, and the town of Santo Domingo on its coast was the first permanent white settlement of the Western world. It was long a Spanish possession of importance and was one of the first colonies to which negro slaves were brought. The French began their settlement there about 100 years later, and in 1697 the western part of the island passed by treaty into the hands of the French. See HAITI, REPUBLIC OF; SANTO DOMINGO, REPUBLIC OF.

Haiti, Republic of, a republic occupying the western portion of the Island of Haiti and having an area of 10,750 sq. m., or slightly greater than that of the State of Vermont. For the description of its physical characteristics, see HAITI. The republic was a colony of France, but after the emancipation of its slaves in 1793, the state of anarchy which existed could not be quelled by French authority. Toussaint L'Ouverture, an able negro, rescued the country from its unfortunate condition and became the commander of the colony. In 1803 Napoleon carried him to France, but the natives refused to accept French control and became independent in 1804. The present constitution dates from 1889. The executive is a president elected for seven years; the Legislative Assembly consists of a Chamber of Communes and a Senate. The people are chiefly negroes, mulattoes and descendants of the French settlers. The prevailing religion is the Roman Catholic. Port-au-Prince is the capital and is located on a large bay, with an excellent harbor. Other cities of importance are Cape Haïtien, Aux Cayes, Gonaïves and Port de Paix. Population, 2,020,000.

Hake, a well-known fish of the Cod Family, from which boneless shredded and smoked cod are frequently prepared. There are six or seven species, all having long bodies, one short and one long dorsal fin, a depressed head and a protruding lower jaw. The hake feeds close to the bottom and devours all kinds of small fish and mollusks. Another fish of this same name has recently been separated into a family by itself, the Hake Family. Fishes of this class have long, small-scaled bodies and tooth-lined jaws. They are found in Northern waters and as far south as the West Indies.

Hakluyt, *Hak' loot,* **Richard** (about 1552-1616), an English geographer and historian, educated at Oxford. He was the first to teach the use of globes. In 1582 he published *Divers Voyages Touching the Discovery of America,* which was later supplemented chiefly by *The Principal Navigations, Voyages and Discoveries of the English Nation,* a work greatly valued by mariners. In 1589 he was appointed by Raleigh a member of the company formed for furthering the colonization of America.

Hal'berd, or **Hal'bert,** a weapon of warfare combining spear and battle-ax. The halberd was first used in Scandinavia and Germany and was brought into use in France in 1420 by the Swiss. The shaft varies in length from five to six feet. The head is an ax blade balanced by a pick with a pike head. It was in

common use in the fifteenth and sixteenth centuries by foot and artillery, called halberdiers, and at the present time is frequently seen on ceremonial occasions.

Halcyon, *Hal' si un.* See KINGFISHER.

Halcyone, *Hal si' o ne,* daughter of Æolus, was the devoted wife of King Ceyx, of Thessaly, who was so distressed by the fearful prodigies following the death of his brother that he determined to consult the Ionian oracle of Apollo. Halcyone frantically begged him either not to expose his life to the wild sea voyage, or to take her with him. Ceyx calmed her as best he could and, vowing to return in two months, set sail. Shortly afterward he was drowned in the Ægean Sea. Meanwhile Halcyone prayed so earnestly for her husband's return that Juno, moved to pity, had Morpheus delegated to impersonate the dead Ceyx, and, by appearing to her while she slept, acquaint the Queen with her husband's fate. On awakening from what she knew was a divine vision, Halcyone rushed to the seashore where she had bid Ceyx farewell. Seeing a dark object floating toward her on the waters, she miraculously flew toward it. It was her husband's body, which, incredibly, flew to meet her; both had that instant been changed into the birds which are now called kingfisher.

For seven days in winter Halcyone sits over her floating nest on the waters, while Æolus guards the winds and preserves calm for her. Hence comes our expression, *halcyon days.*

Hale, Edward Everett (1822-1909), clergyman, philanthropist and author, born in Boston, and educated in the Boston Latin School and Harvard University, where he graduated in 1839. From 1846 to 1856 he was pastor of the Unitarian Church at Worcester, Mass. He removed to Boston in 1856 and became pastor of the South Congregational Church in that city, continuing in the pastorate for 45 years. During these years he also did editorial work on the *Daily Advertiser,* Boston; revived the *New England Magazine;* founded and for a long time edited the *Christian Examiner;* also a magazine called *The Old and the New,* which was afterwards merged with *Scribner's Monthly.* In 1903 he was chaplain of the United States Senate. Dr. Hale wrote many stories, some of them exceedingly realistic, as for example, *The Man Without a Country.* His book, *Ten Times One Is Ten,* led to the organization of the Helping Hand Society, and numerous other organizations of like nature.

Hale, Nathan (1756-1776), an American soldier and patriot of Revolutionary fame, born at Coventry, Conn. He graduated from Yale in 1773, and enlisted in the army at the opening of the Revolution. He commanded a company under Colonel Webb and was given recruiting duty in New York. He took part in the Battle of Long Island, and at the call of Washington, volunteered to enter the English lines as a spy. Just as he was returning to American headquarters he was caught, and on the morning of Sept. 22, 1776, was executed by order of Howe, in New York City. His last words were: "I only regret that I have but one life to lose for my country." Hale's grave is unmarked; but memorial statues have been erected to him in Hartford, Conn., and in City Hall Park, New York.

Halévy, *Al"a"ve',* **Ludovic** (1834-1908), a French dramatist, born in Paris. Together with Henri Meilhac he produced several sparkling farces, comedies and sketches; their greatest success was the sensational drama, *Frou-Frou.* Working independently, Halévy wrote chiefly satiric novels and idyllic sketches. His *L'Abbé Constantin* was enthusiastically received. He also produced *M. et Mme. Cardinal, Criquette* and *Les Petites Cardinal.*

Half-Breeds, the members of the faction of the Republican Party in New York in 1881 and thereafter who favored civil service reform, opposed the regular Republican machine and supported President Garfield in his controversy with Senator Conkling and Senator Platt.

Their opponents, called Stalwarts, sided with Conkling and Platt, and in 1880 persistently advocated a third term for Grant.

Half Tone, a process by which engravings, wash drawings and photographs are reproduced on metal plates and made ready for printing. The fundamental principle of the half tone is the diamond-ruled screen introduced into this country by Max Levy. The process consists of taking a photographic negative of the drawing to be reproduced, made through this screen, which has been prepared as follows. A plate of the finest sheet glass is coated with a varnish of asphalt and wax, which is placed on a bed of an automatic ruling machine capable of making lines to a fineness of 500 to an inch. The cutter is a diamond-pointed graver and is gauged to cut any desired width. The lines are cut through the coating into the glass diagonally at an angle of 45°, the number depending upon the character of the plate desired, whether for fine book work or for coarse printing. The plate is then treated with hydrofluoric acid, which eats or bites into the exposed lines. Afterwards, these lines are filled with an opaque pigment, and the plate is baked in an oven, which hardens the pigment. The plate is then cleaned and polished smooth, leaving the clear glass transparent. Two of these plates identically ruled and prepared are now cemented together with Canada balsam, being so placed that the lines of each cross at right angles, forming diamond shapes.

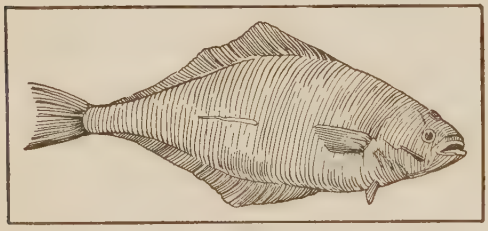
This screen is placed in the camera in front of the sensitive plate, and the image is broken into dots, whereby the light and shade of the original is reproduced, the dots being so fine as to be unrecognizable. A sensitized plate of copper is exposed under the half-tone negative and is given a cold-water bath, and the portions not printed on are washed out. The picture reproduced on this plate is hardened and then etched afterwards, mounted on wood type-high for printing. The sensitized solution consists of a compound of fish glue, albumen, chromic acid, bichromate of ammonia and water, and this is flowed over the plate a number of times or spread by having the plate rapidly revolved in a machine made for the purpose, so that the sensitized solution may be evenly distributed. When it is required to reproduce drawings, they should be made two or three times larger than the print desired, because in reducing their size in the camea the lines come out with more distinctness in the half tone than if made originally the same size.

A process known as stagmatophy has recently been devised that does away with the ruled screen and produces a picture free from the dotted or lined appearance common to most half tones. In this process a plate of copper or zinc is coated with a gum-gelatin emulsion, made sensitive to light by the addition of potassium bichromate. The emulsion is made by mixing solutions of gum arabic and gelatin. The gum arabic does not dissolve in the gelatin, but is distributed through the solution in minute globules, which come to rest at approximately equal distances from each other. The dry plate is exposed under an ordinary negative and etched at once. The globules of gum arabic form the necessary granulation for the half tone, and by this process it is claimed that a much more satisfactory picture can be obtained than by the ordinary method. See PHOTOGRAVURE; ETCHING.

Hal'ibur"ton, Thomas Chandler (1796-1865), a British-American humorist, who wrote under the pen name of Sam Slick. He was born at Windsor, Nova Scotia, and attended King's College in his native town. Called to the bar in 1820, he became judge of the Common Pleas in 1828 and judge of the Supreme Court in 1842. On his retirement from the bench in 1856 he removed to England, entering Parliament as a Conservative in 1859. Haliburton is best known as the creator of Sam Slick, who appears in a series of newspaper sketches (1837, 1838, 1840) as a Yankee clock maker and peddler. The drollery, knowledge

of human nature and originality of this character have made the sketches widely popular. Among Haliburton's other works are *Wise Saws and Modern Instances, Bubbles of Canada, Rule and Misrule of the English in America* and *An Historical and Statistical Account of Nova Scotia.*

Hal'ibut, a large food fish of the Flounder, or Flatfish, Family, abundant in northern regions of both the Atlantic and Pacific oceans. Like all flatfish, it has a peculiar twisting of the cranium by which both eyes are upon the same side of its head. It has a single, pointed dorsal fin and a single anal fin, reaching almost to the caudal fin. The flesh is highly prized, and to supply the market, halibut is taken in large quantities on both coasts of America. Individuals



HALIBUT

weighing 400 lb. have been caught, but such size is extremely uncommon; the average weight of males is from 30 to 50 lb. and of the females somewhat more. Catching and shipping halibut is an important industry. See FISH COMMISSION, UNITED STATES; FISHERIES.

Hal'ifax, a city of Canada, the capital and metropolis of Nova Scotia, is situated on a peninsular point, lying between Halifax Harbor and the North West Arm, also on the Intercolonial, Canadian Pacific and other railroads. The harbor, one of the finest in the world and protected by 11 forts and batteries, terminates in Bedford Basin, which possesses ten square miles of anchorage for large seagoing vessels; and the extensive steamship connection with the United States, British and West Indian ports makes Halifax one of the chief Atlantic seaports of Canada. The city is built around the base of and on the sloping sides of a hill, which is crowned by a citadel, and along the shores of the North West Arm are the summer homes of the wealthier citizens. Point Pleasant Park is used for both military and pleasure purposes. The public gardens, covering 17 acres, are the most beautiful, according to their size, in America. Buildings of note include the government house, Dominion Building, custom-house, postoffice, the Melville Island Military Prison, the armories, the state home, St. Luke's and the Roman Catholic cathedrals and St. Paul's Church, the school for the blind, the school for deaf and dumb and the conservatory of music.

The chief industries are fisheries, commerce and manufacturing. The manufactories include sugar refineries, factories for the making of furniture and other articles of wood, a skate factory and cordage works.

Halifax was founded in 1749 as a military colony, with Edward Cornwallis as governor, and was named in honor of the Earl of Halifax. Edward, Duke of Kent, father of Queen Victoria, was stationed here four years at the head of the garrison. Population in 1911, 46,619.

Hall, Asaph (1829-1907), an American astronomer, born in Goshen, Conn., and educated at Central College, New York, and at the University of Michigan. He was assistant in the observatory at Harvard, and aide in the United States Naval Observatory at Washington, where he was later professor of mathematics. In 1895 he became professor of astronomy at Harvard. His greatest discovery was that of the two moons of Mars, and his most valuable work deals with the double stars.

Hall, Granville Stanley (1846-), an American educator and psychologist, born at Ashfield, Mass., and educated at Williams College and at Berlin, Bonn, Heidelberg and Leipsic. He was professor of psychology in Antioch College, 1872-76, and lecturer on psychology at Harvard and Williams, 1880-81. In 1888 he became professor of psychology in the newly-founded Clark University at Worcester, Mass., and president of that

institution. He is an eminent authority in his field. He is a frequent contributor to educational magazines and is editor of the *Pedagogical Seminary* and the *American Journal of Psychology.* His greatest work, *Adolescence,* is an exhaustive and authentic treatment of this subject.

Hal'lam, Henry (1777-1859), an English historian and critic, born in Windsor. After graduating at Oxford and studying law at the Inner Temple, he became a barrister and practiced until 1812, when he retired and devoted himself to literary and historical work. He was a Whig, but took a general rather than a partisan interest in politics. His studies are analytical, lucid and unsurpassed in accuracy and detail. They include contributions to the *Edinburgh Review, The Constitutional History of England from the Accession of Henry VII to the Death of George II* and *Introduction to the Literature of Europe in the Fifteenth, Sixteenth and Seventeenth Centuries.* His son, Arthur Henry Hallam, became an essayist of note, and his name has been made memorable by reason of its connection with Tennyson's *In Memoriam.*

Hal'leck, Fitz-Greene (1790-1867), an American poet, born at Guilford, Conn. After serving as clerk in a New York bank for 20 years, he became the confidential agent of John Jacob Astor and was one of the original trustees of the Astor Library in New York. In 1819 he began to contribute the humorous series of "Croaker Papers" to the New York *Evening Post.* He was associated with Joseph Rodman Drake until the time of Drake's death, which event occasioned one of Halleck's best-known and most beautiful poems, the one beginning "Green be the turf above thee." He also wrote satiric political and social verse, the longest and most popular being *Fanny.* After his visit to Europe in 1822-23, he published a slender volume which includes practically all of his contributions of genuine lyric poems. Among them are *Alnwick Castle, Burns* and *Marco Bozzaris.*

Halleck, Henry Wager (1815-1872), an American soldier, born in Westernville, N. Y., and educated at West Point. In 1845 he visited the military establishments of Europe, and, upon his return, delivered in Boston a course of lectures on the science of war, which later appeared in book form under the title *Elements of Military Art and Science.* He participated in the Mexican War, but in 1854 he left the army, becoming a lawyer and director of a mining company in San Francisco. At the opening of the Civil War he was created major-general in the regular army, and shortly succeeded Fremont in command of the Western Department. Following victories at Paducah, Ft. Henry and Ft. Donelson and at Corinth, he became, in July, 1862, commander-in-chief. This post he held until superseded by General Grant in 1864, when he was appointed chief of staff of the army, remaining such until April, 1865. Halleck published several military and scientific treatises.

Hal'ley, Edmund (1656-1742), an English astronomer and mathematician, born in London, England. He studied at St. Paul's School and at Queen's College, Oxford. After leaving college he soon became interested in astronomy, going to St. Helena in 1676 for the purpose of making a catalogue of the stars of the southern heavens. In 1680 he made the careful observations of the comet that bears his name, and which formed so important a part of the basis of Newton's calculations. Halley was the first astronomer who ever foretold the return of a comet.

Hall of Fame, a memorial building in New York City whose erection was made possible by a gift to the New York University of $10,000 to be used for that purpose. The building stands upon University Heights overlooking the Hudson, and contains 150 panels which are to be inscribed with the names of native Americans of note. Only those are admitted who have been dead for ten years and whose names have been selected by a committee of 100

eminent authorities representing every state of the Union. After the last selection 58 names had been chosen, including Washington, Lincoln, Emerson, Fulton, Farragut, Lee, Grant, Audubon, Channing, Harriet Beecher Stowe and Frances Willard.

Hal"loween', or **Hallow-Even,** the evening of the 31st of October, which is the eve of All-Hallows, or All-Saints Day, Nov. 1. This was originally a pagan celebration, when, in thanksgiving for the harvest, the Druids of England held their great autumn festival. In their celebration they lighted fires in honor of the sun god; and, in the Highlands of Scotland and Wales, where the Celts for centuries survived the invasions of other races, the lighting of bonfires long remained a feature of the festivities. In Ireland, the celebration has also retained traces of its early Celtic origin and is known as the "Vigil of Saman," the lord of death, who was supposed to assemble on this occasion those wicked souls which, during the preceding year, had been condemned to inhabit the bodies of animals. To these Celtic features were added, in early Christian times, others characteristic of the Roman festival in honor of Pomona, and thus nuts and apples, typical of nature's bounty, came to play an important part in various rites. See Brand's *Antiquities of Great Britain.*

Ha'lo, a general term used to designate a variety of luminous appearances in the sky. Halos appear to be rings about the sun or moon, and are believed to be due to diffraction or scattering, by particles of moisture, of the light in the atmosphere. The halo around the moon is thought to be due to refraction of the light. These halos are commonly called coronas. Sun halos seen in the Arctic regions are due to the refraction of light by the ice crystals of cirrus clouds. These halos sometimes have the appearance of circles within circles intersected by vertical or horizontal lines of light. At the points of intersection, bright spots appear, which are called mock suns or sun dogs.

Hals, *Hahls,* **Frans** (about 1584-1666), a famous Dutch painter of portraits and scenes of everyday life, next to Rembrandt, the greatest of his school. He was born at Antwerp, where he studied under Karel van Mander. He has been called the father of Dutch *genre,* or scenes of everyday life, and was one of the greatest portrait painters that ever lived. Among his chief works in the former class are *Jolly Trio, Fool Playing a Lute, The Bohemian Girl* and the famous *Hille Bobbe.* His greatest portraits include *Nicholas Berensteyn and His Wife; Girl of the Berensteyn Family; William van Heythuysen* (Vienna), by some considered his masterpiece; and *Descartes;* besides numerous singing boys and lute players. In the Metropolitan Museum of Art, New York, and the Art Institute of Chicago are examples of his portraits. In breadth and boldness of execution he has never been surpassed by any other master.

Ham'burg, a seaport of Germany, capital of the State of Hamburg, situated on the right bank of the Elbe River, 63 m. from the North Sea and 178 m. by rail n.w. of Berlin. The State of Hamburg, which includes the city with its suburbs, as well as several islands and surrounding communes, embraces a territory of 160 sq. m. The city is the foremost seaport of the European Continent and the third largest port in the world. The older portion lies to the east of the Alster, extending over a low plain and crossed by several canals which serve as picturesque and convenient thoroughfares. To the west are the Neustadt and the suburbs of Altona and St. Pauli. St. Georg lies to the northeast.

The Jungfernstieg is the principal commercial street. Among the prominent buildings are the churches of St. Nicholas, St. Michael and St. Catherine, the Rathaus, the Exchange, the buildings of the German Meteorological Station, the Stadt-Theater, the new Supreme Court, the public art gallery, the Natural History Museum and the hospi-

tal at Eppendorf (one of the finest of the kind in Europe). As a shipping center, Hamburg is of great importance, partly because of its geographical position and also because of the complete dock and harbor facilities, the harbor being one of the impressive sights of the world. Hamburg is one of the largest emigration ports of Germany, and ranks among the foremost cities in money-exchange transactions. It is the greatest Continental market for coffee, and its other imports include coal, cotton, foodstuffs and raw materials. The industries are shipbuilding, cigar making, brewing, spirit and sugar refining, meat curing, coffee roasting, flour milling and the manufacture of chocolate, ivory, celluloid, leather, furniture, musical instruments and mechanical and optical apparatus.

Hamburg was founded by Charlemagne in 808. By its treaties with Lübeck and Bremen, in 1241 and 1249, the Hanseatic League was formed. In 1810 it became a part of the French Empire and suffered commercially from Napoleon's Continental System. It entered the German Confederation in 1815 and became a part of the German Empire in 1871. The population of the State of Hamburg, exclusive of the city, was, in 1905, 72,085. Population of the city alone, 802,793.

Ham'ilton, a city of Canada, capital of Wentworth Co., Ontario, situated on the shore of Burlington Bay, at the head of Lake Ontario. The city is a regular port of call for all the steamship lines operating from Montreal to the head of Lake Superior. Besides being the center of a complete electric-railway system, it has direct connection with the Grand Trunk, the Canadian Pacific, the Canadian Northern, the Toronto, Hamilton & Buffalo, the Michigan Central and the New York Central railroads.

Hamilton is favorably situated in the heart of a rich and prosperous fruit and agricultural district. The city has practically an unlimited amount of electric power, which is supplied by two large companies, one at Decew Falls and the other at Niagara Falls. The attractiveness of the city, which is renowned for its beautiful homelike conditions, is enhanced by its parks, driveways and recreation grounds. The mountain driveway affords a delightful view of the city and surroundings, while Dundurn, Harvey, Gore, Victoria and North Shore parks, together with the golf links, the Hamilton Athletic Association grounds and Burlington Beach, which is lined with the homes of city residents, give ample opportunity for outdoor enjoyment.

The noteworthy buildings include the custom-house, city hall, post office, normal school, a public library and Collegiate Institute. The city is an excellent place for the location of factories, and considerable United States capital is invested in industrial pursuits. About 400 manufacturing establishments are located here, among which are those for the manufacture of iron and steel, agricultural implements, canned goods, electrical apparatus, jewelry, cotton, woolen and tobacco products and wood specialties. The city was founded in 1813. Population of the municipality in 1911, 81,969.

Hamilton, Alexander (1757-1804), an eminent American statesman, born in Nevis, an island of the West Indies. His marked abilities early attracted the notice of friends, and at the age of 15 he was sent to Elizabethown, N. J., to prepare for college. A year later he entered Columbia College, and was soon writing such able letters on colonial issues that they were attributed to John Jay. At the beginning of the Revolution he became captain of artillery, and fought so efficiently that Washington gave him a place on his staff in 1777 and utilized his services as friend and adviser as well as aid-de-camp.

Soon after the Battle of Yorktown, where he led a storming party, he left the army and began to study law in New York. He was there admitted to the bar and soon attained eminence in his profession. He served in Congress

in 1782-83, and took an important part in the Constitutional Convention of 1787, where he urged a much stronger centralized government than was finally incorporated in the Constitution. He accepted the Constitution as submitted, however, and worked enthusiastically to secure its adoption by the states, accomplishing this end in the Legislature of New York almost single-handed against great odds. His famous articles in *The Federalist* had marked influence in turning the popular mind in favor of the Constitution.

Upon the organization of the new government Washington made Hamilton secretary of the treasury, and it is not too much to say that in this capacity he not only saved the credit of the nation, but also laid the foundations of our national financial policy. In 1795 Hamilton resigned from the cabinet because of serious differences with Jefferson, who was also a member, and resumed his law practice in New York. He still remained the real leader of the Federalists, however, advising with Washington, writing the noted "Camillus" letters in defense of the Jay Treaty, and influencing the course of public opinion. Personal and political animosities led to a challenge to a duel by Aaron Burr, which was accepted, according to the customs of the times, and Hamilton was mortally wounded, dying the next day. Hamilton's reputation has increased with the passing years, and he is now regarded as one of the most brilliant statesmen America has produced.

Hamilton, Gail. See DODGE, MARY ABIGAIL.

Hamilton, Ohio, a city and county seat of Butler Co., 25 m. n. of Cincinnati and 32 m. s.w. of Dayton, on both banks of the Great Miami River, on the Miami & Erie Canal and on the Cincinnati, Hamilton & Dayton, the Erie, the Pennsylvania, the Louisville, Cincinnati & Dayton, the Grand Rapids & Indiana and other railroads. The Ohio Electric and Millcreek Valley interurban lines give excellent service to Cincinnati, Dayton and Toledo and many other towns and cities. The water power derived from both the river and hydraulic canal has aided the city's development.

The streets of the city are well paved and shaded and there are many handsome residences. There are several parks, including Ludlow Park, First Ward Park, Lindenwald Park and the new River Front Park. The site of Old Ft. Hamilton, founded in 1791 by General St. Clair, is marked by the Soldiers' and Sailors' Monument. Campbell Avenue is an extensive boulevard.

Among the most prominent public buildings are the county courthouse, Federal Building, Rentschler Building, a number of banks, new Hamilton Y. M. C. A. Building and a number of churches of handsome architectural design. The educational institutions include a high school, public and parochial schools and the Lane Free Library. Among the charitable institutions are the Mercy Hospital, Children's Home and Butler County Infirmary.

Among the leading industrial establishments are extensive paper and paper-pulp mills, iron foundries, woolen mills, railway-tool works, bank-vault and fireproof-safe works, Corliss-engine works, breweries and manufactories of power punching and shearing machinery, agricultural machinery, paper and pulp-mill machinery, sugar-mill and plate-glass machinery, computing scales, stoves, woodworking machinery, carriages, harness and upholstery leather, ornamental wire, steel and bronze goods, railway frogs and switches, typewriter ribbons, sanitary appliances, knit goods, motor cars, steel letter files, carbon paper and flour. There is also considerable trade in tobacco, grain, vegetables and farm and dairy products.

The first settlement was made in 1791 when Gen. Arthur St. Clair built a fort and named it Ft. Hamilton in honor of Alexander Hamilton. Gen. Anthony Wayne launched from this fort his successful campaign against the Miamis that broke the Indian power and opened the Northwest Territory to settlement. The fort was abandoned in 1796 and the

village that sprang up about it was incorporated as a town in 1810. In 1854 Rossville, on the opposite side of the river, was annexed, and in 1857 a city charter was granted. Population in 1920, U. S. Census, 39,675.

Hamilton, Sir William (1788-1856), a Scottish theologian and philosopher, born in Glasgow. After gaining distinction as a student at Glasgow he went to Oxford, where he took first honors. In 1813 he was admitted to the Scottish bar. Turning his attention to literature and philosophy, he was appointed professor of history at the University of Edinburgh in 1821, and in 1836 became professor of logic and metaphysics in the same institution. In 1844 he was stricken with paralysis, but continued to do his work, with the aid of an assistant, until his death.

Hamilton was an exponent of the "common sense" school of Scottish philosophy. He accepted a natural realism, maintaining that we are directly conscious of external objects. In his doctrine that the unconditioned cannot be known and that God is an object of faith, not of knowledge, he closely approached the position of Kant. He was for many years a regular contributor to the *Edinburgh Review*. In 1852 he edited these contributions with additions, under the title *Discussions in Philosophy and Literature, Education, and University Reform*. After his death was published his *Lectures on Metaphysics and Logic*.

Ham'ites, a race in northern Africa, the supposed descendants of Ham. The Copts, Somalis, Nubians, Berbers, Abyssinians and Guanches belong to the class. The dialects are, the Libyan (known as Berber), the Cushitic, or Ethiopian, and the ancient Egyptian. The northern Hamites reached a comparatively high state of civilization. The eastern Hamites are pastoral and nomadic tribes.

Ham'lin, Hannibal (1809-1891), a vice-president of the United States, born in Paris Hill, Me. He was admitted to the bar in 1833. He served in the State Legislature in 1836-40 and in 1847; in the lower branch of Congress in 1843-47; and in the Senate in 1848-56, the latter year being elected governor of Maine. He joined the Republican Party, which he had helped to organize. In 1860 he was elected vice-president of the United States on the ticket with Lincoln. He was again United States senator from 1869 to 1881, when he became minister to Spain, serving for two years.

Ham'mond, Ind., a city of Lake Co., 18 m. s.e. of Chicago's business center, on the Grand Calumet River and on the Erie, the Baltimore & Ohio, the Michigan Central, the Pennsylvania, the Wabash and other railroads. As far as its industries are concerned Hammond is a part of Chicago. It has extensive slaughtering and packing houses, iron and steel works, a piano factory, wagon and carriage factories, printing plants, flour and starch mills, book binderies, glue works, brickyards, tanneries, foundries, chemical works, a nail plant and steel-spring works. Hammond was settled in 1868 and named in honor of Abram A. Hammond, acting governor of Indiana in 1860-61. It received a city charter in 1883. Population in 1920, U. S. Census, 36,004.

Hampden, *Ham' den,* **John** (1594-1643), an English stateman famous for his refusal to be taxed by royal prerogative. He was educated at Oxford and first sat in Parliament in 1621. He drew the attention of the whole nation upon him when he refused to pay the demand of Charles I for ship money. This was a tax originally limited to London and the maritime towns, but which in 1635 was extended to the inland counties by Charles. In 1637 Hampden was prosecuted for nonpayment. Although seven of the twelve judges voted against him, the people had formed their own opinion in his favor. He sat in the Short and Long Parliaments, and was one of the five members sought by Charles when he tried to intimidate Parliament. After the Civil War began he was placed in

command of a Parliamentary regiment. He was wounded on Chalgrove Field in 1643 and died a few days later.

Hamp'ton, Wade (1818-1902), an American soldier and statesman, born at Columbia, S. C. He graduated from the University of South Carolina, studied law, and then gave his attention to his great estates. He served for a time in both branches of the South Carolina Legislature. When the Civil War broke out he enlisted in the Confederate army, raising and equipping the famous "Hampton's Legion." During the war Hampton rose to the rank of lieutenant-general, serving with Lee and Johnston, and becoming commander-in-chief of the Confederate cavalry. After the war he exerted his influence to secure loyalty to the Union. In 1876 he was elected governor of his state; in 1879 he entered the United States Senate, where he served with great ability until 1891; and two years later he was appointed United States commissioner of railroads.

Hampton Normal and Agricultural Institute, Hampton, Va. (1868). This is a coeducational school, established under the auspices of the American Missionary Association, by Gen. S. C. Armstrong, who became its first superintendent. The General Assembly granted a charter in 1870, and five years later gave the school one-third of Virginia's share in the Federal land grant for the support of agricultural and mechanical instruction. Many Indian pupils, chiefly from the Sioux tribe, have also been enrolled here since 1878. The most eminent of its many graduates is Booker T. Washington, the founder of Tuskegee Institute. The institution has 1160 acres in its farm, 27,000 volumes in its library, a faculty of 54 men and 58 women, about 1400 students, and assets amounting to over $3,470,300. See WASHINGTON, BOOKER TALIAFERRO; TUSKEGEE NORMAL AND INDUSTRIAL INSTITUTE.

Hampton Roads, Battle of, a naval battle between the Federal ironclad warship *Monitor* and the Confederate ironclad *Merrimac,* fought in Hampton Roads March 9, 1862. On the previous day the Federal frigate *Congress,* the sloop *Cumberland,* the frigates *Minnesota* and *Roanoke,* with the ship *St. Lawrence,* were attacked by the Confederate ironclad *Virginia,* but more popularly known as the *Merrimac,* whose armor rendered it invulnerable to the shot from the Federal ships. Within a short time after beginning the attack the *Merrimac* had sunk the *Cumberland* and disabled the *Congress.* During the night the *Monitor,* an ironclad ship constructed on an entirely different pattern, arrived, and on the morning of the ninth the contest began and lasted several hours. While to outward appearances neither

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ship was seriously injured, the *Merrimac* withdrew, and some days later was sunk by the Confederate naval authorities. This was one of the most spectacular conflicts of the war, and also one of the most far-reaching in its influence, since it revolutionized naval construction; all nations began to build ironclad warships. See MONITOR, THE.

Hampton Roads Conference, an informal conference held Feb. 3, 1865, with reference to the arrangement of a peace between the North and South. The meeting, which lasted four hours, took place on board the *River Queen* near Fortress Monroe, toward the close of the Civil War. President Lincoln and Secretary of State Seward repre-

sented the United States Government, and Vice-President Stephens, Senator R. M. T. Hunter and Assistant Secretary of War John A. Campbell, the Confederate States. The originator of this conference was Francis P. Blair. The representatives failed to agree on the most important points at issue and the conference failed of accomplishing its purpose.

Han'cock, John (1737-1793), an American Revolutionary statesman, born in Braintree, Mass. He inherited a large fortune from his uncle. From 1766 to 1772 he served in the Massachusetts Legislature, where he advocated the cause of the colonists. After the Boston Massacre he was one of the commissioners who demanded the withdrawal of the British troops from the city. He was elected to the Provincial Congress in 1774. It was his arrest and that of Samuel Adams that the British were attempting in their expedition to Concord in April (1775), which resulted in the Battle of Lexington.

From 1775 to 1780 Hancock represented Massachusetts in the Continental Congress, being president of that body from 1775 to 1777; and in that capacity he was the first signer of the Declaration of Independence. He served as major-general in the Revolutionary War, and was most liberal in the use of his fortune for the patriot cause. He was the first governor of Massachusetts as a state, which office he held from 1780 until his death, except in 1785-86, when he was again a member of the Continental Congress. Hancock was a man of pleasing address, excellent education, firmness of character and unquestioned patriotism.

Hancock, Mich., a city in Houghton Co., opposite Houghton on Lake Portage, and on the Duluth, South Shore & Atlantic and other railroads; and on a ship canal communicating with Lake Superior. Hancock is situated in the Lake Superior copper belt and has valuable copper mines, smelting works, machine shops, foundries, stamp mills, lumber mills and brickyards. Notable features of the town are a Finnish college and a public park. Settled in 1859, Hancock was incorporated in 1863 and is governed under a charter of 1895. Population in 1920, 7,527.

Hancock, Winfield Scott (1824-1886), an American soldier, born in Pennsylvania and educated at West Point. He participated in the war with Mexico, and became quartermaster of his regiment. In 1861 he was made brigadier-general of volunteers, with command of a brigade in the Army of the Potomac. He distinguished himself at Williamsburg, Antietam, Fredericksburg and Gettysburg, where he was severely wounded, and was prominent in the campaign of the Army of the Potomac of 1864-65. In 1866 he was appointed major-general in the regular army, and in 1867 superintended reconstruction in Louisiana and Texas. In 1880 he was Democratic candidate for presidency. Grant considered Hancock the most conspicuous general officer who did not hold a separate command in the Civil War.

Hand Ball, an Irish and an American sport similar to the English game of *Fives*. It is played indoors by two or four persons on a well-floored court measuring about 60 by 24½ ft., and enclosed, save at one end, by walls approximately 35 ft. high. The floor should be of wood and the front wall of brick, faced with marble, while the side walls may be of cement. A service line is drawn parallel to the front wall through the middle of the court. A single rubber ball is used, which in Ireland is called a *red ace* or a *black ace,* according to its color. The striker, standing in front of the service line, bounces the ball upon the floor and then with his hand endeavors to strike it against the front wall. If it strikes either side wall before hitting the front, or rebounds either within the service line or behind the court, he tries a second time. If he again fails to put it into the player's territory, that is, between the 30- and the 60-foot lines, it is a *hand-out* and the players change

places. If the ball is properly served by the *striker,* and his opponent, the *player,* fails to strike it before it hits the floor or on the first bound, back against the front wall, the striker scores one point. The game is usually for 21 points, but rules vary somewhat. Hand ball is one of the favorite games of those who are training for contests requiring great endurance and agility. See *Spalding Athletic Library.*

Han'del, George Frederick (1685-1759), a German musician and composer, born at Halle. He early showed a love and appreciation for music. At the age of 12 Handel could play the violin, oboe, organ and several other instruments, and through the intercession of his teacher, Zachau, he was sent to Berlin for further study. When but 17, he was appointed organist at the cathedral of his native town. After occupying that post for one year, Handel played in the orchestra at Hamburg, where in 1705 his first opera, *Almira,* was performed with great success. This was followed after a few weeks by *Nero.* From 1706 to 1709 he studied in London and there produced the opera *Roderigo.* Upon his return to Germany he was appointed chapelmaster to the Elector of Hanover, but he returned to England, and while there produced many operas and oratorios and was director of the Haymarket Theater. Ill health put an end to his public activities, and in 1752 he became blind; but he continued to write and to play upon the piano, deriving much solace from both. Handel holds an exalted place among the greatest of the world's composers and his music reaches to sublime heights. His greatest and best-known work is the oratorio *The Messiah.* Others of his orchestral compositions are *Israel in Egypt, Saul, Esther, Samson, Alexander's Feast, Deborah* and *L'Allegro.*

Hangbird. See ORIOLE, subhead *Baltimore Oriole.*

Hangchow, *Hahng' chou',* a city of China, capital of the Province of Chekiang, situated near the Tsientang River, about 100 m. s.w. of Shanghai. Canals connect it with Shanghai and Suchow, these waterways forming the highway of commerce through the richest district of China. Features of interest are the Nestorian Church, several Protestant and Catholic missions, colleges, hospitals, temples, arches, monuments, bridges and baths. The city is recognized as the center of Chinese literary and ecclesiastic life. In commerce it is important because of its silk manufactures, tinsel paper, gold and silver work, fans and lacquered ware. In 1896 it was declared open to foreign trade. Population, estimated at from 400,000 to 800,000.

Hanging Gardens of Babylon, a structure of ancient Babylon, referred to as one of the wonders of the ancient world. It is supposed to have been a tower, or pyramid, constructed by Nebuchadnezzar to satisfy the longings of his Median Queen for sights other than the dreary stretches of the Babylonian plain. In construction, it rose in terraces which were planted in trees, shrubs and flowers; and a large force of men were employed in irrigating its gardens by water pumped from the Euphrates.

Hankow, *Hahn' kou',* a river port and commercial city of China, situated in the center of the country on the left bank of the Yangtse River. The native city has narrow, dirty and crooked streets, but the foreign settlement to the east has excellent streets and substantial buildings and is kept in spendid condition. Commercially, the city is of the first importance. The industrial establishments comprise hemp, flour and cotton mills, iron and steel works, a mint and a tannery. The exports are tea, tobacco, silk, hemp, vegetable wax, medicines and coal. Population, including the surrounding concessions and departmental cities, about 1,500,000; of Hankow alone, approximately 870,000.

Han'nibal (about 247-about 183 B. C.), a Carthaginian general and statesman. He was devoted from youth to the overthrow of Rome. At 26 he was

commander of the Carthaginian army in Spain, and gained the southern half as a province for Carthage, then took Saguntum, an ally of Rome, after a long siege. Hannibal's services in Spain led to war between Rome and Carthage. During this war Hannibal led his army over the Alps, a feat supposed impossible, and defeated the Romans in several engagements on their own ground. The most noted of these was the Battle of Cannæ (216 B. C.), in which the Romans lost over 80,000 men. The success of Scipio in Africa caused Hannibal's recall to defend Carthage, and he was defeated by Scipio near Zama in 202 B. C. After peace was restored he was made chief magistrate, in which position he proved himself as great a statesman as he was general. In time, Roman jealousy compelled him to retire, and soon afterwards he ended his life by taking poison. See PUNIC WARS.

Hannibal, Mo., a city of Marion Co., about 15 m. s. of Quincy, Ill., and about 90 m. n.w. of St. Louis, on the Mississippi River and on the Wabash, the Chicago, Burlington & Quincy, the Missouri, Kansas & Texas, the St. Louis & Hannibal and other railroads. It has steamboat communication with other points along the river and carries on a considerable trade in agricultural produce, flour, lumber and tobacco. The principal manufactures are shoes, stoves, cigars, car wheels, lime, cement, furniture, and foundry and machine-shop products. The residential part of Hannibal is built upon elevated ground above the river and commands fine views. There are several bridges across the river connecting with East Hannibal, Ill. The important buildings include a United States Government Building, municipal buildings, a high school building and a public library. There are also a city hospital and public park. Mark Twain spent his boyhood at Hannibal, which was the scene of parts of his *Tom Sawyer, Huckleberry Finn* and *Life on the Mississippi.* Hannibal Cave is near the town. Hannibal was platted in 1819 and chartered as a city in 1839. South Hannibal was annexed to it in 1843. Population in 1920, U. S. Census, 10,392.

Han'over, a province of northwest Prussia, formerly a kingdom of Germany. It is bounded on the n. by the North Sea, on the e. by Saxony and Brunswick, on the s. by Hesse-Nassau and Westphalia and on the w. by Holland. It includes the old Brunswick-Lüneburg possessions, and also Hildesheim, East Friesland, Osnabrück, Göttingen and other districts. In the region of the Harz Mountains are valuable mineral deposits and dense woods, and the valleys are fertile. The coast, like that of Holland, is low and frequently subject to overflow. The manufactures include cotton and woolen textiles, leather, machinery, wagons, paper, chemicals, glassware, etc. The early history of Hanover is identical with that of Brunswick. In 1692 it became an electorate; in 1714 George Louis, Elector of Hanover, became King of England (as George I), and as a result of this, Hanover grew rapidly in importance. A century later it was established as a kingdom by the Congress of Vienna. It was annexed to Prussia by the Peace of Prague in 1866. Population, about 2,760,000.

Hanover, a city of Prussia, the capital of the Prussian Province of Hanover. The city is divided into the old and new towns, and in the newer part are many handsome edifices, including the new municipal buildings. The Royal Palace, the old Marktkirche, the old Gothic Rathaus and the Royal Theater are other prominent buildings. The manufactures are important. Hanover was originally a fishing village, and in 1241 it received a municipal charter, two centuries later joining the Hanseatic League. Since 1866, when the Kingdom of Hanover was annexed to Prussia, it has been the capital of the Province of Hanover. Population, about 303,000.

Hanseatic, *Han"se at' ik,* **League,** or **The Hansa,** a union established in the 13th century by various cities of northern Germany for the purpose of protecting

their trade. Between 1241 and 1255 Lübeck and Hamburg entered into a compact whereby the control of the Baltic and North seas was put into the hands of the merchants of those cities. In 1259 Lübeck, Rostock and Wismar formed an alliance against pirates and land robbers, and in 1284-85 Lübeck, Wismar, Rostock, Stralsund and Greifswald, by waging war, secured from Eric of Denmark certain privileges. Various other groups of allied cities found it advisable to join the Lübeck union, which in 1343 was officially named The Hansa. The league at one period included every important city between Netherlands and Livonia, and for years it was the mistress of the Baltic and the German Ocean. Its services to trade, agriculture and the industrial arts were notable, but after the 15th century its power rapidly declined.

Hapsburg, House of, the most celebrated dynastic house in the history of Europe. For two centuries they were scarcely noticeable among the confused lists of petty German chieftains. In 1273, Rudolph I was elected Emperor of the Holy Roman Empire. From that date until the close of the World War they played a leading part in the history of Europe. With the exception of the century following 1332, they furnished the emperors of the Roman empire until that empire ceased to exist in 1740. From the time of Rudolph II, the Hapsburg furnished the rulers of Austria until the downfall of that empire in 1918. By reason of a succession of fortunate marriages the Hapsburg exercised rule over Austria, Germany, the Netherlands, Spain; and a large part of what is now the United States, Mexico, Central America, the Spanish states of South America, the West India Islands, and the Philippines. The ill-fated Maximilian, Emperor of Mexico was a Hapsburg.

Harbin, *Har been'*, or **Kharbin,** a town of Manchuria, situated on the right bank of the Sungari River. The town was founded in 1896 as a center for the surveys of the Chinese Eastern Railway Company, and soon became the junction of the Manchurian main line and the branch line extending south to Port Arthur. During the Russo-Japanese War it was an important Russian military station. Population, estimated at 20,000.

Harbor, an outlet on the shore of a sea or lake forming a roadstead, or port, for ships, being either a natural conformation for protecting them against wind and waves or having an artificial system of walls or breakwaters. A harbor includes all the structures and appurtenances to facilitate the safe anchorage, loading, unloading and repairs of vessels, such as quays, docks, breakwaters, jetties, piers and wharves. The value of a harbor depends largely upon the depth of its water, its freedom from breakers and its natural protection against sea storms. Harbors are maintained usually by national governments, and liberal appropriations are made to dredge and otherwise improve them in order to make a safe entrance for ships. The United States spends nearly $20,000,000 annually in keeping in condition its various harbors, not including the expenses of quarantine stations or the removal of wrecks.

HARBOR CONSTRUCTION. The open-coast harbor, consisting of a quay wall or bulkhead wall open to the sea, is the simplest form, but it serves only to tie up ships alongside the shore, to discharge and receive cargoes, and affords no protection from winds, tides or currents. A straight pier, extending out from the shore, affords no shelter from waves coming inshore, but in case of winds and waves alongshore, it gives some protection on the lee side. When the pier is curved with its convex side to the sea, there is better protection, but it is best to build two curved piers, converging toward each other, so as to include a harbor basin. A breakwater wall built offshore to break the force of the waves is sometimes employed, and a harbor may contain a combination of all these structures. Jetties are also employed for protecting harbors, as well as to maintain their depth (See JETTY). The harbor of New York is so enclosed

VIEWS OF WASHINGTON, D. C.

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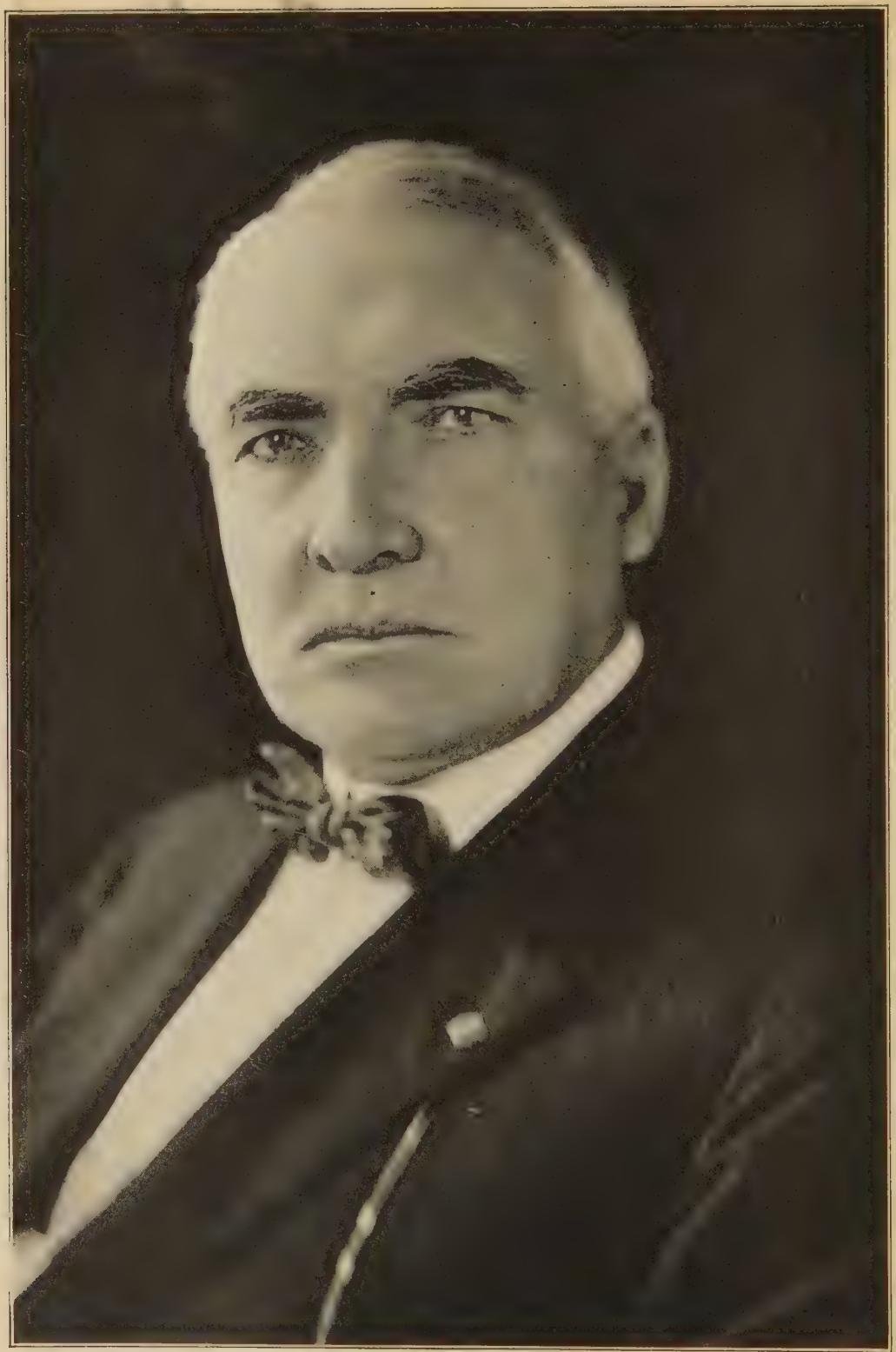
EXECUTIVE MANSION

The home of the president and family, commonly known as the White House.



WARREN G. HARDING

by a natural conformation that piers or breakwaters are not needed.

Hard Cider Campaign, the name given to the Whig political campaign of 1840, which for popular enthusiasm and widespread activity has had few equals in American politics. The Whig presidential nominee, William Henry Harrison, was a man of plain manners, and a Democratic organ asserted that if a barrel of hard cider and a log cabin were donated Harrison would be content to remain on his farm in Ohio. This expression caught the popular fancy and the log cabins and hard cider became especial emblems of the party of "Tippecanoe and Tyler, too."

Hardecanute, *Har"de ka nute',* or **Harthacnut** (about 1019-1042), King of England and Denmark. His father, Canute, died in 1035, after having firmly established a kingdom which practically extended throughout England, and Hardecanute, who was in Denmark at the time, was there acclaimed king. But his half brother, Harold, who was in England, possessed himself of Mercia, Northumbria and Wessex. However, Hardecanute quietly succeeded to the throne in 1040, though the government, during his nominal sway of two years, was left mostly to his mother and to the famous Earl Godwine. Hardecanute was succeeded by his half brother, Edward the Confessor.

Hardenberg, *Har' den berk,* **Karl August,** PRINCE (1750-1822), a Prussian statesman, born in Hanover. He appears prominently in history during the Napoleonic wars. After Prussia's defeat at Jena, Hardenberg became minister of foreign affairs, and in 1810 was made Prussian chancellor. He now entered upon a vigorous policy of reform, determined to accomplish the regeneration of Prussia and to make his country strong enough to resist Napoleon. In this he was successful. He took part in the proceedings of the Congress of Vienna, being raised to the rank of Prince in 1814. See STEIN, HEINRICH.

Harding, Warren G. (1865-). The twenty-ninth President of the United States. Born at Corsica, Ohio, Nov. 2, 1865. Graduated at the Ohio Central College, 1882. His youth and early manhood were spent amid the trying days of reconstruction, after the Civil War, when questions of greatest moment in national affairs were under constant discussion; and so, naturally, he became interested in political affairs and began, while yet a young man, to take an interest in state politics. Shortly after graduation, he entered journalism and founded *The Marion Star,* at Marion, Ohio.

During the first years of his venture, he was editor, reporter, compositor and publisher, combined, and soon became known as one of the Republican leaders of the state. He was elected to the Ohio State Senate in 1900, remaining a member until 1904. Defeated for re-election, he resumed work as editor of the *Star.*

In 1915, he was elected to the United States Senate and remained a member until 1921. This was during the trying days of the World War, and as member of the Foreign Relations Committee of the Senate he became a leader in party counsels. At the Republican National Convention in 1920, Mr. Harding was a candidate from the start; when it became evident that none of the leading candidates could be nominated, the convention turned to him as one who could unite all factions. In the election that followed, he was elected President by an overwhelming majority.

Har'dy, Thomas (1840-), an English novelist, born in Dorsetshire. He was educated as an architect, but turned to literature at the age of 27. His view of life is hopeless, often despairing; his theme is not civilization and manners, but humanity—almost primitive in its simplicity. Nature, as he has seen it along the rugged countrysides of Wessex, has an unending charm for him; in *The Return of the Native* the grim and somber heath is as much a personality as are the human characters moving slowly to their tragic end. His view of women is biased, cruel; but he has created unforgetable types, and though his stern realism and fatalistic attitude to

life do not make for popularity, he has rank as one of the greatest modern English novelists. He has written *A Pair of Blue Eyes, Far from the Madding Crowd, The Return of the Native, The Trumpet-Major, Tess of the D'Urbervilles, Life's Little Ironies* and *Jude the Obscure.*

Hare, a family of Rodents including both the hare and the rabbit. There are about 60 species scattered over all parts of the globe, except Madagascar and Australasia, but most numerous in Northern regions. All have long, erect ears, sharp incisor teeth, a divided upper lip and a short, furry, upturned tail. The long hind legs, which enable it to run with great speed, especially uphill, give the hare great advantage over a pursuing enemy. The home of the true hare is upon grassy plains or rocky, bramble-covered hillsides. Unlike the rabbit it never burrows, but, in coldest winter, may seek the shelter of a hollow tree or of a discarded woodchuck's hole. By day it crouches upon its trampled bed, or "form," where overhanging branches and tall grasses conceal it. At the approach of danger it rises quickly upon its haunches, erects its inquisitive ears, then crouches back or leaps away to safety. When speed alone will not save it from its enemy the hare takes to stratagem, doubles on its track, leaps over its pursuer occasionally, even striking it forcefully and unexpectedly with its active hind legs as it goes over, and sometimes swimming with fair speed across intervening streams.

The young of the hare, called leverets, are born in the form, are fur-covered and active and have keen sight. The mother cares for them about four weeks before they are able to shift for themselves. Like the rabbit, the hare is extremely prolific. The flesh of the hare is dry, but of good quality. The so-called Belgian hare is really a pure breed of rabbit, while the jack rabbit of the Western plains is better called the prairie hare. See RABBIT.

Harebell, a delicate plant of the Campanula Family growing in groves and marshes or in the crevices of nearly-barren rocks. It has slender spreading stems and rounding root leaves, but the stem leaves are narrow and inconspicuous. The flowers are a delicate light blue, and they swing on their stems at

HAREBELL

the breath of the slightest breeze. They have five-parted corollas, which the bees enter, fertilizing the pistils as they brush against them in their search for nectar. Although the harebell is seemingly a delicate plant, it is strong enough to survive cold climates and rough winds. It blooms throughout the entire summer, and in the United States is found from Maine to California. In Europe, espe-

cially the British Isles, it is called the bluebell of Scotland, and it is also common in Asia.

Hargreaves, *Har' greevz,* **James** (about 1720-1778), an English inventor. He was an illiterate man and earned his living by weaving and spinning in his home, according to the custom. In 1760 he invented the carding machine and four years later he produced the spinning jenny. The amount of cotton which he was able to spin excited suspicion, and his house was broken into and the machine destroyed. Manufacturers stole his design and the government refused him a patent. Hargreaves, therefore, never profited much from his inventions, which, with the power loom, established the cotton industry on a new basis.

Har'lan, John Marshall (1833-1911), an American jurist, born in Boyle County, Ky. He graduated at Centre College in 1850, studied law, was admitted to the bar in 1853 and became county judge in 1858. From 1861 to 1863 he was colonel in the Union army, was attorney-general of Kentucky from 1863 to 1867, and was appointed associate justice of the United States Supreme Court in 1877. He was a member of the commission to settle the Bering Sea Controversy in 1893.

Har'land, Marion. See TERHUNE, MARY VIRGINIA.

Har'lequin Duck, a bird of the Duck and Goose Family. It is about 17 inches long; the female is dull sooty or grayish, with white on the side of the face. The male has a black head, white-spotted on the sides, lead-colored chest and shoulders, a white neck band, blackish under parts, reddish sides and wings with four white spots and one metallic-blue spot. The nest is made in a hollow tree or under rocks, and contains six to eight eggs. This handsome duck is an inhabitant of eastern Asia, northern North America, Greenland and Iceland. It breeds from the mountains of California and Colorado to the Arctic coast. Next to the wood duck, the harlequin is the handsomest of the American ducks. It is rare in the United States, though fairly common in zoological gardens. The varied plumage of the male suggests the name harlequin.

Har'mon, Judson (1846-), an American lawyer and jurist, born at Newton, Ohio, and educated at Denison University and the Cincinnati Law School. He was mayor of Wyoming, Ohio, 1875-76, judge of the Court of Common Pleas, 1876-78, and judge of the Superior Court, 1878-88. He was attorney-general of the United States in Cleveland's second cabinet, and in 1909 he was elected governor of Ohio on the Democratic ticket. He was reelected in 1911. In 1912 he was prominent as a presidential candidate, being identified with the conservative wing of the party.

Harmon'ica, originally a musical instrument constructed with glasses of different sizes, arrayed on a disk which was attached to a mechanism allowing it to be revolved by the foot. The glasses were played upon by touching the rim with a moistened finger. The term *musical glasses* was also given the mechanism. The name is now frequently applied to a mouth organ.

Harmony. See MUSIC.

Harms'worth, Sir Alfred Charles William (1865-), an English journalist, born near Dublin and educated privately and at Stamford Grammar School. In 1894 he became editor and proprietor of the London *Evening News,* two years later founded the London *Daily Mail* and in 1898 established *Harmsworth's Magazine.* Meanwhile, in 1894, he organized and promoted the Jackson-Harmsworth Arctic Expedition. In 1900 he visited the United States, publishing an issue of a New York daily indicative of his views of the future newspaper. In 1905 he was created Baron Northcliffe.

Har'ness, an arrangement of leather straps usually held together by sewing and provided with buckles. The harness is placed upon an animal, generally a horse, to enable it to draw loads. A single harness consists of a bridle fitted to the head of the animal, with a metal

bit to which is buckled reins, or lines, in order to drive the animal in the direction desired and to control its actions. A saddle, held in place by a girth, supports the weight of the shafts of the vehicle and is fastened to the breeching, by which the animal backs the load. Hames are fitted on a collar and are provided with traces to draw the vehicle. Wagon harness is made heavy and strong, while buggy harness is light and generally ornamented.

Harold II (1022-1066), King of England, the last of the Anglo-Saxon line. He was the son of the powerful Earl Godwine. After his father's death in 1053, Harold became Earl of Wessex and head of the National Party, which aimed to counteract the Norman influence at the court of Edward the Confessor. In 1064 he invaded Normandy. When Edward the Confessor died, in 1066, Harold was elected king. Obliged to defend his election by force of arms, he defeated the supporters of William at Stamford Bridge, Sept. 25, but was himself defeated by William near Hastings, on Oct. 14, and slain. See HASTINGS, BATTLE OF.

Harp, a stringed musical instrument of great antiquity. It consists of a triangular frame about five and a half feet in height, across which are stretched 46 strings arranged vertically. It is tuned to the diatonic scale of C flat, which can be modified by the several pedals, each connected with a particular set of strings. The strings are plucked by the performer with the fingers of both hands.

Har'per, William Rainey (1856-1906), an American educator and scholar, born at New Concord, Ohio, and educated at Muskingum College and Yale University. After teaching for five years in preparatory schools, he was professor of Hebrew in the Baptist Union Theological Seminary, Chicago, 1879-1886; professor of Semitic languages at Yale, 1886-1891, and of Biblical literature, 1889-1891; principal of Chautauqua College of Liberal Arts, 1885-91; president and head professor of Semitic languages and literature at the University of Chicago, 1891-1906. He may properly be considered the creator of the new University of Chicago, of which he was the first president. Upon its campus, facing the beautiful Midway Plaisance, a magnificent memorial library has been erected in his honor. As an administrative officer he displayed unusual abilities. He won an international reputation as a student and teacher of Hebrew, was the author of several Hebrew textbooks emphasizing the inductive method of study, and was editor of three publications of the University of Chicago—*The Biblical World,* the *American Journal of Theology* and the *American Journal of Semitic Languages and Literature.* See CHAUTAUQUA MOVEMENT; CHICAGO, UNIVERSITY OF.

Harper's Ferry, W. Va., a town in Jefferson Co., on the Baltimore & Ohio railroad, 55 m. n.w. of Washington, D. C. It was the scene of John Brown's Raid, Oct. 16, 1859 (See BROWN, JOHN). At the outbreak of the Civil War, upon being abandoned by the Federals, the Confederates occupied it, first under Jackson and later under Johnston. They evacuated it on June 15, 1862, and afterward the Union leaders, Miles and White, held the place with 11,000 men until the Confederates under Jackson appeared and bombarded it. The town surrendered as he was about to open an attack, Sept. 15, 1862.

Har'pies, three winged monsters, part woman, part bird, with straggling black hair, red eyes and leaden lips and claws. They poisoned whatever they touched. In punishment, Jove sent them to snatch the food from the tables of Phineus, from whose land they were driven to the Strophades, where Æneas was tormented by them.

Harpoon', a spearlike implement used in killing whales and other large fish. It is made of steel or iron, with a broad head sharpened and provided with barbs. It is usually about three feet long, and its shank is attached to a long rope, or whale line, which is coiled in the whale boat. The harpoon is thrown by a strong sailor with great

force into the whale, or it is shot from a special form of gun. Of recent years the bomb lance has come into use, this being shot from a gun and arranged to explode on penetrating the whale's body.

Harpsichord, *Harp' si kord,* an obsolete musical instrument, resembling in shape the modern grand piano, but much smaller in size. The performer struck the keys in the manner of the piano player, thereby raising a set of quills or bits of hard leather which plucked the strings and produced a sharp, thin sound. In some of these instruments the keyboard was double, and again stops were provided for modifying the tone. See PIANOFORTE.

Harpy Eagle, a bird of the Hawk and Eagle Family. It is a bird of prey about 42 inches long, with large, powerful talons and a strong hooked beak. It is grayish or lead-colored above, barred with black; white beneath, with a black bar across the chest. The head is whitish with a dark crest. The large nest is made in a tall tree or on a ledge of an inaccessible cliff. The nesting habits are not well known, but it is reported that the nest contains five eggs. This eagle is very fierce, hunting small Mammals and birds. It is a native of the dense forests of tropical America from Bolivia to Mexico.

Har'rier. See MARSH HAWK.

Harriman, Edward Henry (1848-1909), an American financier and railway president, born in Hempstead, N. Y. At the age of 14 he began work in a broker's office in New York, and at 22 was a member of the New York Stock Exchange. Later he became a director and then vice-president of the Illinois Central Railroad. In 1897 and the years immediately following, he gained control of the Union Pacific, which he reorganized and greatly improved. Harriman then secured control of the Southern Pacific and the Oregon Railroad and Navigation Company. The control of these and their affiliated lines made Harriman at the time of his death the leading railway magnate of America. In 1899 he organized and financed a scientific expedition to Alaska. In 1910 his widow presented most of his estate of 26,000 acres at Arden to the State of New York for a state park.

Harris, Joel Chandler (1848-1908), an American author, known as "Uncle Remus," born in Eatonton, Ga. He became an apprentice to the printer's trade, studied law, and, after serving on the staff of the Savannah *Daily News* and the Atlanta *Constitution,* became editor of the last-named paper in 1890. In connection with his journalistic work appeared a popular series of sketches and a collection of folk lore, later published as *Uncle Remus, His Songs and His Sayings.* These humorous pieces in negro dialect were faithful delineations of the life and homely philosophy which he had discovered on the plantations in the South, and the public clamored for more. *Nights with Uncle Remus* and *Uncle Remus and His Friends* soon followed. Other publications are *Free Joe and Other Georgian Sketches, Balaam and His Master, Mr. Rabbit at Home, Uncle Remus and Br'er Rabbit, Stories of Georgia History* and *Life of Henry W. Grady, Including His Writings and Speeches.*

Harris, Robert (1849-1919), a Canadian artist, born in North Wales and educated at Prince of Wales College, Charlottetown. He studied art in London, Paris, Italy, Belgium and Holland. In 1880 he became a member of the Royal Canadian Academy, of which he was president from 1893 to 1906. Known principally as a figure and portrait painter, he has exhibited in London and Paris and was awarded medals at the Chicago, Buffalo and St. Louis expositions. Among his most successful portraits are those of Lord Aberdeen, Sir John A. Macdonald, Sir Mowat and Archbishop Bond.

Harris, William Torrey (1835-1909), an American educator, born at Killingly, Conn., and educated at Yale. In 1857 he began teaching shorthand in the public schools of St. Louis. Ten years later he became superintendent of the schools there, and during the next 13 years made

a national reputation in that position. In 1867 he founded *The Journal of Speculative Philosophy,* the first journal of the kind in the English language. With Miss Susan E. Blow he established in St. Louis in 1873 the first permanent public school kindergarten in America. His able service as United States commissioner of education, from 1889 to 1906, won him an international reputation. In 1906 the Carnegie Foundation for the Advancement of Teaching voted him the highest retiring allowance which their rules would allow. Dr. Harris was a prolific writer on educational and philosophical subjects, and was editor of the *International Education Series* and editor-in-chief of the 1909 Revised Edition of the *International Dictionary.*

Harrisburg, Pa., a city, county seat of Dauphin Co. and capital of the state, 105 m. n.w. of Philadelphia and 85 m. n.w. of Baltimore, on the east bank of the Susquehanna River and on the Pennsylvania, the Philadelphia & Reading, the Northern Central, the Cumberland Valley, the Philadelphia & Erie, the Philadelphia, Harrisburg & Pittsburgh, the Schuylkill & Susquehanna and other railroads. Several electric systems with interurban lines connect the city with nearby towns and cities. Harrisburg has an area of seven square miles and possesses great scenic beauty. The mile-wide Susquehanna is here spanned by four bridges, two for railroads and two for driving. The city proper is situated on the slope of a hill, and overlooking the river are the finest residences, among them the governor's mansion. There is a monument 110 ft. high in memory of the Dauphin County soldiers who died in the Civil War, and a statue of Gen. John F. Hartranft.

Parks and Boulevards. Harrisburg is noted for its well-kept streets and boulevards. A parkway encircles the city and connects the park system, which contains a total acreage of over 972 acres. Among the city parks are Capitol Park of 16 acres, containing the state capitol buildings. Other parks include Paxtang, Reservoir, Harris, Lincoln, Promenade, Gross and Wildwood.

Public Buildings. The most prominent building is the state capitol, dedicated in 1906, which was erected to replace the one burned in 1897. The estimated cost of this building is about $12,000,000. The dome is modeled after St. Peter's at Rome. At the main entrance is a fountain 78 ft. wide. The bronze doors are decorated in relief with state historical scenes and the floor of the rotunda is paved with tiles in the style of the pottery made by early Moravian settlers. The Senate and House chambers have stained glass windows designed by W. B. van Ingen, and mural paintings by Edwin A. Abbey. Two heroic groups of statuary for the building were designed by George Grey Barnard. Other public buildings include a state arsenal, courthouse and Federal Building.

Institutions. The educational institutions include the Harrisburg and St. Genevieve academies, high schools, a young ladies' seminary and a conservatory of music. The state library, founded in 1790, contains about 150,000 volumes. The charitable institutions include a city hospital, state insane asylum, children's industrial home and home for the friendless. The city is the seat of a Catholic and an Episcopal see.

Industries. The prosperity of Harrisburg is derived largely from manufactures. Among the industrial establishments are steelworks, rolling mills, blast furnaces, railway repair shops, boot and shoe factories, silk mills, cigar factories, flour and grist mills, tin mills, nail works, pipe-bending works, Bessemer steelworks and manufactories of cotton and woolen goods, mattresses, brick, tile, cornice, galvanized iron, undertakers' supplies, wagons and carriages, marbleized slate, typewriters and railroad cars.

History. John Harris, an English trader, built the first house on the site of Harrisburg in 1726 and secured a grant of land of 800 acres. His son established a ferry here in 1753 and the place was called Harris Ferry. The town was

laid out and named Harrisburg in 1785, and was incorporated in 1791. In 1812 Harrisburg became the state capital and in 1860 a city charter was granted.

Harrisburg is the home of a system of municipal reform, known as the Harrisburg plan, which has attracted widespread attention throughout the United States. All city improvement measures are under control of an authorized board of public works composed of citizens who serve without pay, and are voted upon by the city without regard to political affiliations. Population in 1920, U. S. Census, 75,917.

Harrison, Benjamin (1833-1901), twenty-third president of the United States, born in North Bend, Ohio, the grandson of William H. Harrison, ninth president of the United States. He graduated from Miami University in 1852, was admitted to the bar in 1854, and began practice in Indianapolis, Ind., which he made his home. He joined the Union army as lieutenant when the Civil War began, soon being appointed colonel. He was at Resaca, Kenesaw Mountain and Peachtree Creek; was with Sherman at Atlanta, and participated in the Battle of Nashville. He was commissioned brevet brigadier-general in 1865.

After the war Harrison became Supreme Court reporter, but in 1867 devoted his attention to the practice of law. He made vigorous campaigns for Grant in 1868 and 1872; was defeated for governor in 1876; became a member of the Mississippi River Commission in 1879; and was elected to the United States Senate in 1880, serving one term.

He was elected president of the United States in 1888, defeating Grover Cleveland, the Democratic nominee. In 1892 he was a candidate for a second term, but was defeated by Cleveland. At the expiration of his term of office he resumed his law practice, and lectured and wrote on jurisprudence. He was chief representative of the United States at The Hague Peace Conference in 1899. He published *This Country of Ours* and *Views of an Ex-President.*

Harrison, Carter Henry (1860-), an American politician, born in Chicago, Ill. He attended the public schools in Chicago and went to Germany for further study. In 1881 he graduated from St. Ignatius College, Chicago, and from the law school at Yale University, New Haven, Conn., in 1883. For three years he was the editor and publisher of the Chicago *Times.* He was elected Democratic mayor of Chicago in 1897, 1899, 1901, 1903 and 1905, and again in 1911. In 1900 he was honored by his alma mater with the degree of doctor of laws. Mr. Harrison has served as delegate to several state and national conventions, and was chairman of the committee on resolutions in the Illinois Democratic State Convention in 1900.

Harrison, Constance Cary (1846-), an American novelist, born at Vaucluse, Va. She married Burton Harrison, private secretary to Jefferson Davis, in 1867, and after their removal to New York wrote novels and plays and contributed freely to periodicals. Among her works are *Bar Harbor Days, The Anglomaniacs, A Daughter of the South, Externals of Modern New York, The Unwelcome Mrs. Hatch* and *Transplanted Daughters.*

Harrison, N. J., a city of Hudson Co., formerly called East Newark, opposite Newark, on the Passaic River, 9 m. w. of New York City, and on the Erie, the Pennsylvania and the Delaware, Lackawanna & Western railroads. It is an attractive residential suburb of Newark and other near-by cities and has large and well-kept grounds. The city has manufactories of electric lamps, cutlery, cotton thread, refrigerators, trunks, leather, wire cloth, marine engines, etc., and has steel and iron works. It was settled in 1668 and incorporated in 1873. Population in 1920, 15,721.

Harrison, William Henry (1773-1841), ninth president of the United States, son of Benjamin Harrison, a signer of the Declaration of Independence, was born in Berkeley, Va. He entered the army in 1791 and acccompanied Gen. Anthony Wayne's expedi-

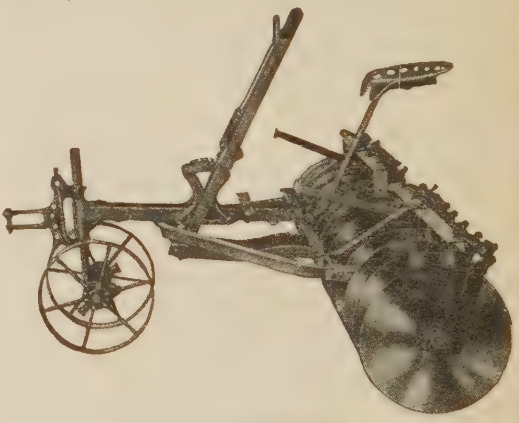
tion against the Indians of the Northwest, showing great gallantry at the Battle of the Maumee. In 1798 he was appointed secretary of the Northwest Territory, but resigned the next year to represent it as delegate to Congress. In 1800, when Indiana Territory was formed, Harrison was appointed governor, and served with great ability and efficiency until 1813. At Tippecanoe he finally quelled the uprising of Tecumseh and his brother in a battle on Nov. 7, 1811, and from this circumstance became known as the "Hero of Tippecanoe."

Soon after the beginning of the War of 1812 Harrison was made brigadier-general in the regular army, and given chief command in the Northwest with full discretionary powers. He was then promoted to be major-general. He repulsed Proctor, the British general, at Ft. Meigs, and, strengthened by Commodore Perry's victory on Lake Erie, pursued the enemy into Canada where he routed the combined British and Indians in the Battle of the Thames, Oct. 5, 1813. He resigned his commission in 1814, and two years later was elected to Congress, where he served until 1819, when he became senator in the Ohio Legislature. In 1828-29 he was minister to Columbia. Retiring to his farm at North Bend, near Cincinnati, he lived in comparative quiet for 12 years.

The Whigs nominated him for the presidency in 1835, but he was defeated by Van Buren. Four years later, however, he was again nominated, and was elected by a large majority, after one of the most remarkable campaigns in American history (See HARD CIDER CAMPAIGN), marking the introduction into presidential campaigns of enormous mass meetings and processions. Within a month after his inauguration Harrison was stricken with pneumonia and died, being succeeded by Vice-President Tyler.

Harriss, Charles Albert (1862-), a Canadian musician and composer, born in London, England. He was organist at various Canadian parish churches, later was concert organist in Canada and the United States and in 1905 became director of the Philharmonic Society of Montreal. From 1904 to 1907 he was the first director of the McGill Conservatorium, Montreal. He directed the first British-American Musical Festivals and the first Canadian-British Festival, and in London in 1907 founded the Empire Day concerts. Dr. Harris, who played before Edward VII, has composed *Daniel Before the King, Torquil, Pan, Sands of Dee* and innumerable choruses, songs and piano and organ pieces. In December, 1911, he was awarded the silver medal of the Musicians of London in appreciation of his service to British music throughout the empire.

Har'row, a well-known agricultural implement employed for pulverizing the



DISK HARROW

soil. The common harrow, as used by farmers, consists of a wooden frame, square or triangular, into which iron teeth have been driven. This is dragged over plowed ground by horses or oxen. For pulverizing unplowed ground, the disk harrow is employed. This consists of a riding implement on two wheels, having a series of steel disks, which, when forced into the ground at an angle, revolve and cut up the soil into fine fragments.

Hart, Albert Bushnell (1854-), an American historian and teacher, born at Clarksville, Pa. He graduated at Harvard in 1880, and after further study abroad, became an instructor, and later, professor of history at Harvard. He has written *Coercive Powers of the*

United States Government, Introduction to the Study of Federal Government, Studies in American Education and other valuable works. He served as joint editor of the *American Historical Review* and of the *American History Leaflets* and edited the *Epochs of American History Series* and other works.

Harte, *Hart,* **Francis Bret** (1839-1902), an American poet and novelist, born in Albany, N. Y. Attracted by the gold excitement, he went to California at the age of 15, and tried his hand at mining, teaching and journalism. In 1868 he founded the *Overland Monthly,* and as its editor contributed sketches and stories of life in the open which attracted wide attention. He removed to New York in 1871, after having been professor of recent literature in the University of California for a year, and became a regular contributor to the *Atlantic Monthly.* He served as United States consul at Crefeld, Germany, and at Glasgow, Scotland, and after 1885 lived in England, dying in London.

Bret Harte possessed a genuine dramatic instinct and portrayed faithfully the life on the frontier. At times he idealized both scenes and characters, but they were invariably drawn from life. His types are large, primitive; and some of his short stories are classics in their masterly delineations of pioneer life. Though he often dealt with the sin and misery that he saw in the world, a wholesome spirit of optimism pervades his work. He is essentially an American, choosing gorges, canyons and mountains as a suitable background for the stormy, spectacular scenes he loves to draw. There is in his work humor, pathos, irony and melodramatic treatment—an impersonal portrayal of characters and facts. He wrote *The Luck of Roaring Camp, How Santa Claus Came to Simpson's Bar, Society upon the Stanislaus, The Outcasts of Poker Flat, Under the Redwoods* and *Plain Language from Truthful James,* also known as *The Heathen Chinee.*

Hartford, Conn., a city, port of entry, county seat of Hartford Co., and capital of the state, 36 m. n.e. of New Haven, 110 m. n.e. of New York and 124 m. s.w. of Boston, on the west bank of the Connecticut River, on the New York, New Haven & Hartford, the Central of New England and other railroads, and at the head of navigation for large vessels on the Connecticut River, 50 m. from Long Island Sound. A stone arch bridge across the Connecticut River connects with East Hartford, which has important manufacturing interests. Interurban electric railroads radiate to all the surrounding towns and cities.

Hartford has an area of 17 sq. m. and is delightfully situated. The more elevated portions of the city command extensive views of the Connecticut Valley. There are several costly residence districts. Many streets and boulevards have magnificent arches of old oaks and elms, and Charter Oak Place (See CHARTER OAK) marks the site where, in 1687, the charter of the state is said to have been concealed.

PARKS AND BOULEVARDS. The park system contains over 1200 acres. Bushnell Park of 46 acres, the oldest and most attractive of the 21 public parks, is crowned by the state capitol and contains monuments to Israel Putnam, Horace Wells, the discoverer of anæsthesia, and Col. Thomas Knowlton. Near the capitol is the soldiers' and sailors' memorial arch. The city is also the seat of a Catholic see.

PUBLIC BUILDINGS. Among the notable public buildings are the city hall, Wadsworth Athenæum, Colt Memorial Library, the Watkinson and state historical society libraries, a state arsenal, state capitol built of white marble in the modern Gothic style, St. Joseph's Cathedral, Centre Congregational Church and Morgan Art Gallery.

INSTITUTIONS. The educational institutions of Hartford include Trinity College, established in 1823, and Hartford Theological Seminary. Among the philanthropic and charitable institutions are the tuberculosis, Hartford and St. Francis hospitals, an old people's home, orphan asylum, school for the deaf and a Union for home work.

INDUSTRIES. Hartford is an important tobacco market. The city is also widely known as the center of insurance interests. The manufacturing interests include extensive manufactories of revolvers, sewing machines, Gatling guns, automobiles, bicycles, typewriters, cyclometers, wagons and carriages, cigars, belting, machinists' tools, horseshoe nails, typesetting machines, electric equipment, drop forgings, car wheels, hosiery and knit goods, envelopes, woven-wire mattresses, steam engines, coil piping, church organs, silverware, boilers, harness, furniture, valves and hydrants. The city is the port of entry for the customs district of Hartford.

HISTORY. A fort was built in 1633 by the Dutch on what is still known as Dutch Point. Later emigrants from Massachusetts settled here and called the place Newtown. This name was changed in 1637 to Hartford, after Hertford, England. On Jan. 14, 1639, the famous *Fundamental Orders of Connecticut* were adopted, forming the first written constitution ever adopted by a people that organized a government. In 1814-15 the Hartford Convention (See HARTFORD CONVENTION) was in session here. Hartford was the capital of Connecticut until 1701, when New Haven became joint capital. Hartford has, however, been sole capital since 1873. Hartford was first chartered in 1784 and rechartered in 1856. Population in 1920, U. S. Census, 138,036.

Hartford Convention, an assembly held in 1814 at Hartford, Conn., representing the Federalists of the New England States, beginning Dec. 15 and continuing for three weeks in secret session. Rumors were afloat that the secession of New England was being planned, but the real aim of the assembly was to propose reforms in the government in the direction of greater independence for the states. The New England States were much opposed to the War of 1812 because it greatly impaired their commerce and seemed an unjustifiable war of aggression. The convention proved of little avail, except that it was the crowning event which led to the overthrow of the Federalist Party.

Harts'horn". See AMMONIA.

Harun-al-Rashid, *Hah roon"-ar-Rasheed'*, (?-809), a renowned caliph of the Saracens. He succeeded to the caliphate in 786, speedily suppressed all insurrections and gave himself unreservedly to pleasure, the country meanwhile prospering under trusted administrators. He made his capital, Bagdad, the most flourishing city of the period. Moreover, he patronized learning, poetry and music, and his court was the resort of the most eminent Mohammedans. He is celebrated in song, narrative and in stories of the *Arabian Nights*.

Har'vard, John (1607-1638), an English clergyman, born in Southwark, London. He secured his education at Emmanuel College, Cambridge, England. In 1637 he came to America and made his home at Charlestown, Mass. He died the following year and left his library and half of his estate of £800 to the college at Newtown. The name of the town was changed to Cambridge and the college was named in honor of John Harvard. See HARVARD UNIVERSITY.

Harvard University, at Cambridge, Mass. (1650), is the oldest and most famous of American universities. In 1636 the General Court of Massachusetts appropriated £400 for the establishing of a college, and the next year decided upon its location at Newtown, subsequently called Cambridge after the site of the famous English university of that name. The college opened in 1638 and graduated its first class in 1642. It took the name of John Harvard in 1639, having received by his bequest his library of some 300 volumes and about $2000 in cash. In its inception Harvard was a state institution and throughout its earlier history it received considerable support from the commonwealth. But its connection with the state was wholly severed in 1866. Harvard is governed by a board of overseers elected by its alumni, since 1880, regardless of state lines. Harvard has a nation-wide clientage and a world-wide influence.

Harvard has an endowment of over $22,000,000 and its property exceeds $30,000,000 in value. The university maintains 17 departments, including several museums and an astronomical observatory which has a branch at Arequipa, Peru, and the Arnold Arboretum at Roxbury. The faculty numbers about 650 and the enrollment in all departments exceeds 5000.

RADCLIFFE COLLEGE was developed from the Society for the Collegiate Instruction for Women, established in 1879. It took its present name and came under the control of Harvard in 1894. Its assets amount to about $1,700,000. It enrolls about 500 students. See ELIOT, CHARLES WILLIAM; LOWELL, ABBOTT LAWRENCE; WOMEN, COLLEGES FOR.

Harvester. See REAPING MACHINE.

Harvest Moon, a term used in the Northern Hemisphere for the full moon at or near the autumnal equinox, Sept. 20. For several evenings the full moon rises at about the same time and is of unusual brilliancy. At this time the moon is moving over that part of its orbit where the angle with the ecliptic is very slight, and the earth, moon and sun are in such relative positions that the moon is full. In the Southern Hempishere this phenomenon occurs in March.

Harz, *Harts,* **Mountains,** a mountain range in northern Germany extending through Prussia, Brunswick and Anhalt for a distance of 60 m., with a total area of 900 sq. m. Its highest summit is the Brocken, with an altitude of 3747 ft. The peaks are too lofty to support anything but a scant vegetation, but the slopes are heavily wooded with beeches, pines and oaks. The important mineral deposits include silver, copper, lead and iron.

Hashish, *Hash' eesh,* an Eastern drug prepared from species of hemp and used as a stimulant. The leaves and tops are steeped, or the resin which they contain is allowed to exude from the stems and is collected. It is sold in drops, which, when sweetened, form a sort of candy; the leaves are chewed or smoked. Hashish produces a peculiar intoxication which may take the form of unnatural gayety or of stupor. Its after effects are less harmful than those of opium and it is sometimes prescribed by physicians as a narcotic.

Hastings, Neb., a city and the county seat of Adams Co., 97 m. w. of Lincoln, on the Missouri Pacific, the Chicago & North Western, the Chicago, Burlington & Quincy and other railroads. The city is situated in an agricultural region and has a considerable trade in live stock, wheat and corn. Among the manufactures are agricultural implements, wagons, flour, foundry products and bricks. Hastings is the seat of Hastings College (Presbyterian), and of the Nebraska State Asylum for the Chronic Insane. It has a fine city hall and three parks. Settled in 1872, the place was incorporated in 1874. Population in 1920, 11,647.

Hastings, Warren (1732-1818), the first governor-general of India. At 17 he went to Calcutta in the service of the East India Company. He was taken prisoner during an Indian uprising, but escaped and did good service under Clive in the recovery of Calcutta. In 1758 Clive rewarded him by the post of resident at the court of Murshidabad. He went to England in 1764, and returned to India four years later as second in council at Madras, and in 1772 he was president of the Council of Bengal In 1774 he became governor-general of India and devoted his energy to the development of the business of the company. He left for England 11 years later, with the country in a highly prosperous condition. Soon after, Burke charged him with acts of injustice and with receiving bribes while in India. Hastings was acquitted in 1795 after he had used nearly all his wealth in his defense. The East India Company settled a large annuity on him, and he passed the remainder of his days at Daylesford.

Hastings, Battle of, a decisive battle between Harold II and William the Conqueror in 1066. Harold had been

crowned king, but William laid claim to the throne. Harold was mortally wounded, the English were defeated and the work of the Norman Conquest began. This is one of the 15 decisive battles of the world. See HAROLD II.

Hat, a covering for the head, usually carrying a brim. Hats were occasionally worn by the Greeks and Romans, but did not become an indispensable article of dress until modern times. In the 15th century hats were extensively manufactured in western Europe, and in the 17th century were introduced into England. Styles in hats are all the time undergoing changes, those of women's hats being more pronounced than men's. Hats are made of various materials, felt, silk, cloth, grass and straw being commonly employed in their manufacture. Felt hats are made of rabbit's hair with a small mixture of beaver fur. Straw hats are made either by plaiting or weaving, the former being the more usual method. The finest straw hats are the Leghorns and Milans of Italy and the Panamas of South America. Very fine straw hats are made also in China and Japan.

Hattiesburg, *Hat'iz burg,* **Miss.,** a city and the county seat of Forrest Co., 84 m. s.e. of Jackson and 111 m. n.e. of New Orleans, La., on the Hastahatchee River and on the Queen & Crescent Route, the Mobile, Jackson & Kansas City, the Mississippi Central, the Gulf & Ship Island and other railroads. There are in and near the city cotton-seed-oil mills, a cotton compress, saw and planing mills, a foundry, machine shops, boiler works, railroad shops, an ice plant and manufactories of naval stores, brick, wood alcohol and mattresses. There are several handsome buildings. Hattiesburg is governed under a revised charter of 1906. Population in 1920, U. S. Census, 13,270.

Hau'berk, a coat of mail, sometimes extending only to the neck, but often coming up over the head as a coif, leaving only the face exposed. The sleeves sometimes terminated at the elbow, but often extended to the wrist, and occasionally even covered the hands as a glove. In the 14th century the hauberk was worn under plate armor.

Haupt'mann, Gerhart (1862-), a German dramatist, born in Silesia. He is one of the most important representatives of modern German dramatic literature, his later writing being distinguished from the earlier realistic dramas by its idealism, mysticism and poetic beauty. His best work is represented by *Before Sunrise, The Sunken Bell, Florian Geyer, The Driver Henschel, The Weavers* and *Hannele.* In 1912 he was awarded the Nobel prize for literature.

Havan'a, the capital of Cuba and one of the important commercial ports of the New World. It is located on the northwest coast of the island upon a fine harbor whose narrow channel, nearly one-half mile in length, opens into a basin capable of sheltering a fleet of 1000 vessels. At the west entrance to the harbor stands Punta Castle, and at the west are Morro Castle and La Cabaña, fortresses that guard the city. Havana is an attractive city with its buildings of Spanish architecture, its tiled roofs and its gaily-painted houses of red, yellow and blue. The inner part of the city is old, and up to the time of the American occupation had narrow, crooked streets, unkempt and unpaved. Owing to the inadequate sewer systems, the city was unsanitary and plagues were frequent. With the improvements in these lines Havana has become a pleasing modern city. Among its attractive edifices are the great cathedral, a fine opera house, and the government buildings. Still more admirable are its beautiful parks, shaded drives and flower-bedecked open spaces. There is a university and several lesser schools. The manufacture of tobacco and sugar refining are the chief industries.

The harbor of Havana was first entered in 1508, and the city was founded in 1515. The city has been many times entered and sacked by pirates; it was once captured by Drake, was attacked by the Dutch and was held for a year by the English. In February, 1898, the United States battleship *Maine* was

blown up in the harbor and the city was blockaded by the American fleet in the Spanish-American War. Population, 360,000.

Havelock, *Hav' lok,* **Sir Henry** (1795-1857), a British general. He entered the British army and in 1823 went to India. He became captain in 1838 and his promotions followed rapidly from that time; he became deputy adjutant-general of the troops in India in 1854. During the mutiny in India he rendered valuable service and crowned his career with the capture of Lucknow.

Haverhill, *Ha' ver il,* **Mass.,** a city of Essex Co., 18 m. n.e. of Lowell and 33 m. n. of Boston, on the left bank of the Merrimac River at the head of navigation, 14 m. from Newburyport Harbor, and on the Boston & Maine and other railroads. It is an important center of street-railway traffic; electric lines radiating from it connect with all the near-by towns and cities of northeastern Massachusetts and southeastern New Hampshire. The city contains several villages and the former town of Bradford, which was annexed in 1897. Like nearly all old New England cities, it is irregularly laid out. Six lakes—Kenoza, Saltonstall, Round Pond, Crystal, Chadwick's Pond and Mill Vale—lie within the limits of the city. There are 15 public parks, the largest of which, Winnikenni Park, is of great natural beauty. Among the noted public institutions are the Bradford Academy for girls, founded in 1803 and one of the oldest academies in the country, St. James School (Catholic), a new high school, the public library and the Hale Hospital. The Buttonwoods, now occupied by the Historical Society, marks closely the site of the first settlement of Haverhill. The Whittier homestead, where the poet was born (See WHITTIER, JOHN GREENLEAF), and the scene of his famous poem *Snow-Bound,* is situated about three miles from the city. The building is now owned by the Whittier Association.

There are extensive woolen mills and morocco factories and manufactories of wool hats, worsted cloth, machinery, tacks, heels, stiffenings, shanks, lasts and patterns. The leading industry, however, is the manufacture of boots, shoes and slippers, chiefly of the finer grades. One of the largest sole-leather manufactories in the world is located here. Haverhill leads the world in the manufacture of low-cut shoes. It stands third in the value of manufactured boots and shoes. The first settlement was made in 1640 and called Pentucket. The name was later changed to Haverhill. In 1890 Haverhill celebrated the 250th anniversary of its settlement, Whittier sending as a tribute his beautiful poem, *Haverhill,* two stanzas of which are appended below. A city charter was granted in 1869. Haverhill has the commission form of government. Population in 1920, U. S. Census, 53,884.

Wise was the choice which led our sires
To kindle here their household fires,
And share the large content of all
Whose lives in pleasant places fall.

More dear, as years on years advance,
We prize the old inheritance,
And feel, as far and wide we roam,
That all we seek we leave at home.

Hav'ersack, a word meaning, literally, a sack for oats, but used to designate a soldier's bag for carrying rations. This bag is made of strong duck cloth, and is secured by a strap passing over the right shoulder. It is carried when on the march, and can contain sufficient food to sustain the soldier until he is again within reach of a base of supplies.

Hav'erstraw, N. Y., a city of Rockland Co., 32 m. n. of New York City, on the west bank of the Hudson River, which here expands into broad Haverstraw Bay, and on the West Shore and the New York, Ontario & Western railroads. At the house of Thomas H. Smith, since called the "Old Treason House," Arnold met André in September, 1780, to arrange for the surrender of West Point. Haverstraw has extensive manufactories of brick and brick machines, and dye works, print mills, etc. The city is surrounded on the west by the steep and rocky cliffs of the Ramapo Mountains. Population in 1920, 5,226.

Havre, *Hah' ver,* a seaport of northwestern France, situated on the estuary of the Seine, 143 m. n.w. of Paris. The chief buildings are the Church of Notre Dame, the Hôtel de Ville, the exchange, an arsenal, a museum and several theaters and schools. Because of its fortifications Havre ranks next to Marseilles in importance as a seaport. It is the great French market for cotton; other exports include silk and woolen goods, coffee, leather, hides, wine, earthenware, glass and fancy goods. Population in 1906, 129,403.

Hawaii, *Hah wi' ee,* or **Hawaiian Islands,** a group of islands forming a territory of the United States and lying in the Pacific Ocean about 2400 m. s.w. of San Francisco and 3392 m. s.e. of Yokohama. The group consists of nine inhabited islands lying between latitudes 18° to 23° north and between longitudes 154° to 161° west, and has a total area of from 6000 to 7000 sq. m. Besides these larger islands, there are several smaller barren rocks. The names of the islands are Midway, Hawaii, Maui, Oahu, Kauai, Molokai, Lanai, Kahoolawe and Niihau. These are all volcanic in origin and the mountains of Hawaii contain some of the largest volcanoes in the world. Mauna Kea and Mauna Loa upon the Island of Hawaii are respectively 13,805 and 13,675 ft. in height, and Kilauea, a lower adjoining peak, is the most active crater in the world. The other islands have volcanoes only slightly less well known.

Climate. The climate of the islands is pleasant and healthful; the temperature rarely falls below 55 degrees or rises above 88 degrees. The amount of rainfall differs greatly in different sections, being as low as 25 inches annually in some parts and as high as 200 inches annually in others.

Products and Industries. The soil is very fertile, and large forests, especially of acacias, candlenut trees and palms flourish. Fruits, both native and introduced, are abundant, and include such plants as the strawberry, guava, mango, banana, Malay apple and raspberry. The chief industries are the raising of sugar cane and the production of sugar, and these occupations employ the great majority of the people. Sugar, rice, coffee, bananas and pineapples are exported. Some cattle are raised on the mountain slopes, but the herds are from imported stock since no animals larger than Rodents are native in the islands. Manufactures are almost unknown.

Inhabitants, Cities, Etc. The native Hawaiians are said to be the most intelligent of the Polynesians; as a race they are of the Christian faith and are industrious and skillful. The pure Hawaiian race is, however, rapidly dying out. At present the greater number of the inhabitants are Japanese, while Caucasians, chiefly Portuguese, and Chinese are also numerous. The principal city and the capital is Honolulu, a city in direct steamship connection with San Francisco, Seattle, Tacoma, Sydney and all Chinese, Japanese and New Zealand ports. Other important cities are Hilo, Lahaina, Kahului and Hanalei.

History. The Hawaiian Islands were discovered by Cook in 1778 and were first called the Sandwich Islands after Lord Sandwich. At that time each island had its own king, but in time the eight islands were united into one kingdom, whose only law was the will of the ruler. In 1840 King Kamehameha granted a constitution, which continued in effect until 1893, when Queen Liliuokalani ascended the throne and attempted a return to the old despotic form of government; a revolution resulted, in which the Queen was deposed and a republic organized. In 1898, after many previous unsuccessful attempts, Hawaii was annexed to the United States, and in 1900 became the Territory of Hawaii. Population in 1920, U. S. Census, 255,912.

Hawk, a bird of the Hawk and Eagle Family. The common hen, or chicken hawk, is the bird known to science as Cooper's hawk. It is about the size of a hen (17 inches long) and is bluish-gray above, darker on the head; the throat and sides of the head are whitish, with black shaft lines, while the rest of the

body is white, with reddish bars. The tail is gray with blackish bars. Cooper's hawk is a good flyer, and usually rises to a great altitude. Its flight is very characteristic, consisting of several wing strokes followed by a period of sailing or soaring. The nest is very large and is made of sticks. It is usually placed near the top of a large tree. Occasionally an old crow's nest or a deserted hawk's nest is used. Four or five bluish or greenish-white eggs are laid, which are unspotted or irregularly marked with brown.

There are three hawks which habitually feed on poultry: the goshawk, Cooper's hawk, and the sharp-shinned hawk, which is smaller than Cooper's hawk, but marked almost exactly like it. The majority of the hawks are beneficial and feed on meadow mice, moles and injurious Rodents, as well as upon insects. The small sparrow hawk feeds largely on grasshoppers, a fact which should lead to its more rigid protection. See SPARROW HAWK.

Hawkins, Anthony Hope (1863-), an English novelist, born in London. After studying at Marlborough and at Oxford, he took up law and was admitted to the bar in 1887. Finding literary work more to his liking, he abandoned law, and has been writing fiction since 1890. *The Prisoner of Zenda,* published in 1894, made him famous. *The Dolly Dialogues,* published the same year and since, are delightful reading because of their neat epigrams and clever repartee. Mr. Hawkins writes with admirable animation and precision of touch. His other writings include *The Chronicles of Count Antonio, Comedies of Courtship, The Heart of Princess Osra, Phroso* and *The King's Mirror.*

Hawkins, or **Hawkyns, Sir John** (1532-1595), an English naval officer and explorer. In 1562 he carried a cargo of 300 slaves from Guinea to Cuba, where he sold them. Two years later he barely escaped capture while trying to enslave a town near Sierra Leone; but he later disposed of two cargoes of Africans. Returning from his third expedition, he encountered a Spanish fleet, was defeated but escaped. Subsequently he was a member of Parliament and was treasurer and comptroller of the navy, in which capacity he was efficient but dishonest.

Hawk Moth, a family of large, powerful moths, with thick bodies and strong wings. In this family the different species, of which there are about 60, vary in color according to their habits and their surroundings. In general, however, they have long forewings, whose posterior margins are noticeably oblique, and short, narrow hind wings generally of paler color. The antennæ are short, and, in the males, are beset with a row of short bristles. The tongue is most commonly long, spiral and very strong. The larvæ, or caterpillars, are large, fleshy worms frequently of bright color. The pupæ are large and leathery in color.

The hawk moths most frequently fly by night or at twilight, and, while on the wing, suck honey from the flowers or the exuding sap of trees. They are most widely distributed in Europe, but are found not infrequently in the United States. All species are admired for their size and for their soft or gaudy colors. See DEATH'S-HEAD MOTH.

Haw'thorn, a small tree or shrub of the Rose Family, which in England is the most common hedge plant and in America is known chiefly as an ornamental lawn shrub. The tree has hard wood; and the branches, hard, spiny thorns. The leaves are cleft, sometimes with rounding and sometimes with pointed lobes. The flowers, which are fragrant, are white or pinkish-white and purple, and, though smaller, resemble the single wild rose in form and growth. In England, where the hedges are unclipped, they form one of the chief delights of the landscape in the spring and early summer. The fruits are yellow, scarlet or coral-red stone fruits scarcely larger than peas, and are called haws. These, like the flowers, grow in loose clusters. Many rural customs of England are associated with the haw-

thorn. The Maypole in southern England is always crowned with hawthorn blossoms and the entire plant is dedicated to the pastoral Muse.

Hawthorne, Julian (1846-), an American novelist and journalist, born in Boston, Mass. He graduated at Harvard and studied civil engineering in Dresden, but soon, like his father Nathaniel Hawthorne, entered upon a literary career. His early productions were in the form of magazine contributions. His writings are characterized by originality and an atmosphere of mystery and romance. They include *The Professor's Sister, John Parmelee's Curse, A Fool of Nature, Confessions of a Convict, Noble Blood, History of the United States* and *Nathaniel Hawthorne and His Wife.*

Hawthorne, Nathaniel (1804-1864), foremost American novelist, born at Salem, Mass. William Hathorne, the head of the American branch of the family, came to America from Wiltshire, England, in 1630. His son John, who was active in the Salem witchcraft persecutions, was followed by a line of seafarers, the father of Nathaniel Hawthorne being the captain of a trading vessel. Upon the death of Captain Hathorne in 1808, his widow at once removed with her three children to her father's house, where the little family lived in almost total seclusion. Nathaniel was a solitary, imaginative boy whose natural liking for the weird and mystical was intensified by the atmosphere of the home life and the haunting memories Salem possessed of the old witchcraft days. As a child he read Shakespeare, Milton, Pope and Thomson. Dr. Worcester, the dictionary maker, was an early teacher. One year of his boyhood was spent on Sebago Lake, in Maine, where, enjoying the solitude of the primeval woods, he lived, as he afterwards said, with the freedom of "a bird in the air." In his early manhood he changed the family name of Hathorne to that of Hawthorne.

At College; First Writings. Returning to Salem to prepare for college, Hawthorne found amusement in issuing a few copies of a periodical which he called the *Spectator,* and which gave evidence of considerable talent. He entered Bowdoin College in 1821, where he became acquainted with Longfellow and formed a lifelong friendship with Franklin Pierce. His college life was not eventful, and he was graduated in 1825 without honors, having distinguished himself only by his compositions. On leaving college, Hawthorne resumed his solitary life in Salem, varying a period of constant reading and writing, which lasted 12 years, by long walks at twilight. Most of what he wrote by day he burned by night, so fastidious were his tastes. A crude story, *Fanshawe,* he afterwards suppressed, but he finally became known to readers by the publication in the Boston *Token* of some of his sketches and tales. Being further encouraged by friendly notices regarding his work, in the London *Athenæum,* he had published in 1837 the first series of *Twice-Told Tales.* Longfellow enthusiastically reviewed the book in the *North American Review,* the beginning of a warm friendship between the two authors.

Hawthorne's appearance as a writer had led to his acquaintance with a lady of literary tastes, Miss Sophia Peabody, to whom he became engaged. The meager financial returns from his literary work made marriage impossible as yet, and he therefore accepted in 1839 a position as weigher in the custom-house at Boston. A change of administration in two years released him from this unattractive work and he was glad to return to his writing in Salem. The first part of *Grandfather's Chair,* a series of sketches for children, appeared in 1841, and in the same year he invested his modest savings of $1000 and a few months of his time in the unsuccessful Brook Farm enterprise (See Brook Farm).

Literary Development. Hawthorne was married in 1842, taking his bride to an historic old house in Concord, where he had as neighbors Ellery Channing, Emerson and Thoreau. The appearance

of a second series of *Twice-Told Tales* in 1842 and of *Mosses from an Old Manse* the following year added to his literary reputation rather than to his financial prosperity, and in 1846 he returned to Salem to accept another custom-house position. This work did not entirely hinder his literary efforts, for he wrote during this period the first draft of *The Scarlet Letter,* which, on its publication in 1850, was received in America and England with deserved warmth.

After the publication of *The Scarlet Letter,* Hawthorne removed to Lenox, Mass., where he wrote *The House of the Seven Gables* and *The Wonder-Book*; later, to West Newton near Boston, producing here *The Blithedale Romance,* a story suggested by his experience at Brook Farm, and some more tales. In the summer of 1852 he bought a house in Concord, Mass., naming it The Wayside. A life of Franklin Pierce, then candidate for the presidency, and *Tanglewood Tales* were written here. On the election of Pierce as president, Hawthorne received the appointment to the consulate at Liverpool, and spent the next seven years in Europe (1853-60), part of this period being devoted to travel in the British Isles, France and Italy. During his residence in Italy he sketched out *The Marble Faun.* The last four years of his life, during which his health gradually declined, were spent at The Wayside and were productive of only a volume of English impressions, *Our Old Home,* and some unfinished stories. He died at Plymouth, N. H., while on a trip to the White Mountains with his friend, Ex-President Pierce, and was buried in Sleepy Hollow, a beautiful cemetery at Concord. Near his grave are those of Emerson and Thoreau.

Literary Qualities. Hawthorne was the most typically Puritan of all the New England group who hold first place in American literature. The deep earnestness, the consciousness of ancestral sin, the sense of the mystery of life were his by inheritance, and the conscience of man was his theme. Yet he was not a moralist. The lessons that his books teach are there because his vision of life was broad and his understanding and interpretation of human nature true to life; his books are not marred by a preaching spirit because he viewed human experiences in the light of his rich, creative imagination. Lacking the prophetic spirit of Emerson, the passionate love of reform that animated Whittier, or the knowledge of world literature possessed by Lowell and Longfellow, he was more than all of these an artist—attaining a grace and perfection of language that place him among the great writers of English prose. His work reflects his own life, that of a man who lived purely, simply and sincerely, keeping somewhat aloof from worldly cares, quietly devoted to his art.

Hawthorne's works consist chiefly of four novels, *The Scarlet Letter, The Blithedale Romance, The House of the Seven Gables* and *The Marble Faun*; five volumes of short tales; American, English, French and Italian note-books; and his books for children.

Hay, the stems of certain grasses and sedges dried and used as fodder. The name is broadly used to include the dried plants of clover, but excludes such grasses as corn, sorghum and sugar cane, and the stems of cereals, as wheat, oats and rye, which are called straw. The hay crop in the United States is the most valuable crop after the cereals. It is produced in all of the states, but its price varies in different sections of the country. The average yield of hay is about one and a quarter tons per acre. It should be cut when in flower and dried in the sun; thus successful haying weather must be warm, bright and dry. The cutting is now done almost entirely by machinery. After being thoroughly dried the hay is often stacked and left with no other protection than its own thatch. For shipping any distance hay is baled, or pressed, into large, tightly-compressed bales of about 200 lb. each. New York, Pennsylvania, Ohio and Iowa, in the order named, are the greatest hay-producing states. See Alfalfa; Clover; Timothy.

Hay, John (1838-1905), an American author and diplomat of Scottish descent, born at Salem, Ind. He graduated at Brown University in 1858, studied law, and was admitted to the bar in Illinois in 1861. He immediately went to Washington, however, as assistant secretary to Lincoln, whose friendship he had gained, and remained with him almost constantly until his death. He acted also as Lincoln's adjutant and aide-de-camp. This friendship later bore fruit in Hay's *Life of Abraham Lincoln,* written in collaboration with John G. Nicolay.

From 1865 to 1870 Hay was secretary of legation at Paris, Vienna and Madrid. He was an editorial writer on the New York *Tribune* from 1870 to 1875. In 1879-81 he was first assistant secretary of state, and was ambassador to Great Britain in 1897-98, after which he returned home to become secretary of state, filling this position until his death. In 1901 he negotiated the Hay-Pauncefote Treaty, dealing with the Isthmian Canal. He also had a leading part in the settlement of Chinese affairs after the Boxer uprising, securing pledges guaranteeing the territorial integrity of China and the "open-door" policy in trade. He was the exponent of a frank and straight-forward diplomacy that commanded universal respect.

In addition to his *Life of Lincoln* he published, among other works, *Pike County Ballads, Castilian Days* and several volumes of essays.

Hay'den, Ferdinand Vandeveer (1829-1887), an American scientist, born in Westfield, Mass., and educated at Oberlin College and in Albany, N. Y., where he studied medicine. He early explored and surveyed the Great Plains and the Rocky Mountains, in 1861 becoming surgeon of volunteers. Following the war, in 1867, he made a geological survey of the Territory of Nebraska. The organization which he effected in making this survey was finally, in 1879, formed into the United States Geological Survey, through his efforts. He superintended the survey until 1886, and wrote widely on the resources of the West.

Hay'dn, Franz Joseph (1732-1809), one of the greatest of musical composers, born at Rohrau, Austria. After various struggles with poverty, his genius was recognized, and in 1758 he was appointed musical director to Count Franz Morzin, for whose orchestra he wrote his first symphony. In 1760 he became assistant choirmaster to Prince Esterházy, succeeding to the directorship in 1766 and remaining nearly 30 years in this capacity. During this period he composed a large number of works in various forms. At the termination of this engagement, he traveled through Europe and visited England, where he was honored by royalty and by Oxford, which conferred upon him an honorary degree. In London he wrote the opera *Orpheus and Euridice* and his oratorios, *The Creation* and *The Seasons.* He was an indefatigable worker, and produced in all some 700 instrumental works, among them 125 symphonies, 77 quartets, about 50 sonatas, 31 concertos, three trios and the famous Austrian national anthem.

Haydn is rightly called the father of the symphony and quartet. These forms reached perfection in his hands, where they became the pattern for all that were written afterward.

Hayes, *Haze,* Rutherford Birchard (1822-1893), nineteenth president of the United States, born in Delaware, Ohio. He graduated from Kenyon College and was admitted to the bar in 1845, beginning his practice at Lower Sandusky, but removing to Cincinnati in 1849. At the beginning of the Civil War he became major of volunteers, and by distinguished service rose to the rank of brevet major-general before its close. In 1864-66 he was a member of Congress, and was governor of Ohio from 1867 to 1871, and from 1875 to 1877.

Hayes was nominated for the presidency of the United States by the Republican Party in 1876. He favored the withdrawal of troops from the South in the interests of conciliation, and advo-

cated civil service reform and a sound financial policy. At the close of his administration he retired from political life and devoted himself to interests of a philanthropic and scientific character. He was a member of the Peabody Education Board and was president of the National Prison Association. Many educational institutions recognized his eminent services by conferring upon him honorary degrees.

Hay Fever, a malady which takes the form of a "cold in the head." It is characterized by a profuse discharge from the nose, sneezing and inflammation of the eyes, causing them to run water. It is enervating to the whole system and causes a feeling of general lassitude. The disease usually appears in the late summer, and it has been thought to be due to ripening of the pollen of certain plants or to dust. It is doubtless greatly aggravated by these agencies. The disease may be forestalled by a change of climate; otherwise it is liable to recur with increasing violence each year and to terminate in asthma.

Hayne, Robert Young (1791-1839), an American statesman, born in St. Paul's Parish, S. C. He was admitted to the bar at the age of 21; served in the War of 1812; was in the State Legislature from 1814 to 1818; was attorney-general of his state during the next four years; was United States senator from 1823 to 1832; and then became governor of the state. He was a strong advocate of states' rights and the nullification doctrine, and gained special prominence by his famous debate with Daniel Webster on that issue in 1830. See NULLIFICATION.

Hay-Pauncefote, *Pons' foot,* **Treaty,** the name applied to the treaty negotiated in 1901 by Secretary of State John Hay for the United States and Lord Pauncefote, ambassador to the United States for Great Britain. This treaty abrogated the Clayton-Bulwer Treaty of 1850 and recognized the right of the United States to construct, own and control a canal across the isthmus connecting North and South America. By the terms of the treaty no guarantees of the neutrality of the canal were to be asked of Great Britain or any other power; the Clayton-Bulwer Treaty was specifically abrogated; and the United States not forbidden to construct fortifications nor required to keep the canal open in time of war.

Hays, Charles Melville (1856-1912), a railway official, born in Rock Island, Ill. When 17 he entered the service of the Atlantic & Pacific Railway, St. Louis, Mo., later being promoted to the office of its general superintendent. In 1886 he was appointed assistant general manager of the Wabash, St. Louis & Pacific Railway. The following year he became general manager of the Wabash Western and two years later was appointed to a like position with the reorganized Wabash system, of which he subsequently became vice-president. From 1896 to 1901 he was general manager of the Grand Trunk Railway, of which, in October, 1910, he became president. He died in the *Titanic* disaster of April, 1912.

Hay'ti. See HAITI.

Haze, an aggregation of minute particles in the air which partly obscure vision. Hazy effects are usually observed when the lower air is in a state of exceptional dryness. Although sometimes caused by the refraction of light in ascending and descending atmospheric currents of different densities over a heated area, known as heat haze, and again by minute particles of moisture in the upper air and called *aqueous haze,* these effects are ordinarily due to dust. The dust is swept into the upper air currents by the wind, where it is frequently of sufficient density to form a veil usually at a height of about 1500 ft., though often much higher. Haze is almost invariably caused by the great forest fires of North America, being produced in this case by the particles of carbon left by the smoke.

Ha'zel, a nut-bearing shrub of the Oak Family, found in thickets mostly in the Northern States. The flowers appear before the leaves in the spring

and are of two kinds; those which produce fruit are borne in fringed or plumed cups, and those which furnish the fertilizing dust are borne in long, drooping catkins. The leaves are broad, light green in color and have margins marked with intricate scallops and lobes. The nut is surrounded by a leafy covering, called a cupule, which tightly encloses its treasure until the frost releases it. Hazelnuts are sweet and very nutritious and, though not sold abundantly upon the market, are sought and prized in regions where they grow. Filberts, which are probably better known commercially, are a variety of hazelnuts which have been produced through cultivation, and are sweeter and more meaty than native hazelnuts.

Many legends and traditions center around the hazel, which like the witch-hazel is said to be efficacious as a divining rod for locating hidden treasure. Legend also connects the comparatively modern word *hazing* with the word *hazel,* since the hazel rod was the ready assistant of the early schoolmaster who strove, by its aid, to induce a more strict application to books.

Ha'zen, William Babcock (1830-1887), an American soldier, born at West Hartford, Vt., and educated at West Point. He joined the Union army at the beginning of the Civil War and won distinction in a number of important engagements. He served under Sherman in his Atlanta campaign and took a prominent part in the capture of Savannah. In 1880 he was appointed head of the signal service and was instrumental in securing great improvement in the service and equipment of the department. He was practically the originator of the weather bureau. See WEATHER BUREAU.

Ha'zleton, Pa., a city of Luzerne Co., 31 m. s.w. of Wilkes-Barre, the county seat, and 114 m. n.w. of Philadelphia, on the Lehigh Valley, the Pennsylvania and other railroads. The Wilkes-Barre & Hazleton electric railroad connects with Wilkes-Barre and Scranton and the near-by towns and cities. Hazleton is picturesquely situated on a broad table land on Nescopeck, or Buck, Mountain, a spur of the Blue Mountains, nearly 1800 ft. above sea level, and is an attractive summer resort. A large and well-kept park and many handsome residences are located here. The principal industry is the mining and shipping of anthracite. Among the public buildings are a state hospital for miners, Hazleton and St. Gabriel's academies, a high school, city hall, convent and over 30 churches. There is a public library and fine municipal buildings. During 1912 a 12-story building was erected. Among the manufacturing establishments are silk mills, knitting factories, lumber and planing mills, shirt factories, ironworks, baking-pan works, earthenware works, cigar factories, casket works, foundries and machine shops, wagon and carriage works and cornice works.

The first settlement was made in 1820. The place was laid out as a town in 1836, incorporated as a borough in 1856 and granted a city charter in 1891. Population in 1920, U. S. Census, 32,277.

Haz'litt, William (1778-1830), an English essayist and critic, born in Maidstone. His father was a clergyman, but in the Unitarian College at Hackney the son showed greater interest in literature and art than in theology and decided to become a portrait painter. He visited the art galleries of Paris in 1802, and ten years later settled in Westminster. After lecturing on philosophy he turned to journalism, and began his work as an essayist and dramatic, art and literary critic. His criticisms illustrated the new spirit of the age in which he lived, the tendency to regard literature with personal enthusiasm, and like Charles Lamb and Thomas De Quincey, contemporary prose writers of the Romantic Period, he united the criticism of literature with the criticism of life. His essays were highly effective, both because of their clear and vigorous style and their wide range of subject matter. His writings were collected under the titles *The Round Table, The Spirit of the Age, The Plain Speaker, Lectures on the Dramatic Liter-*

ature of the Reign of Queen Elizabeth, Table Talk, A View of the English Stage, Lectures on the English Poets and *Life of Napoleon Bonaparte.*

Health, Boards of, institutions organized under government for the purpose of safeguarding the health of citizens. The organizations are national, state or municipal. In the United States there has been no national board of health since 1883, but the duties which would devolve upon such a body are now discharged by the United States Bureau of Animal Industry, various food commissions and by the United States Marine Hospital Service. State boards are established by enactments of the Legislatures of the respective states, and each maintains an advisory relation to the sanitary organizations in various localities over which it has jurisdiction. It is the function of the municipal boards to protect the health of the municipality. This is accomplished by regulating building construction in such a way as to make proper provision for ventilation, drainage and plumbing, and to secure such safety devices as fire escapes and elevators; by controlling the sale of drugs and food, and thereby preventing the marketing of impure food products and drugs under misleading labels; by providing for the removal of garbage and the cleaning of streets; by supervising slaughterhouses, public vaccination and quarantine; and by regulating a multitude of other matters pertaining to the public health.

Hearing. See EAR.

Hearst, William Randolph (1863-), an American journalist, born in San Francisco and educated at Harvard University. In 1886 he became editor and publisher of the San Francisco *Examiner.* He secured possession also of the New York *Journal* and of *The Advertiser,* and founded the Chicago *American.* He has been congressman from New York and president of the National League of Democratic Clubs. He was candidate for president of the United States in 1904, ran for the mayoralty of New York City in 1905, and was candidate for governor of New York State in 1906. Mr. Hearst has been prominent in efforts to secure a regulation of corporate combinations by legal enactments. At the time of the Galveston and San Francisco disasters he took a leading part in securing funds for the relief of the sufferers.

Heart, *Hart,* a muscular organ, whose function is to pump the blood through the body and keep up the circulation. It is about the size of a closed fist, and is in the shape of a flattened cone, with its base extending upward. From the base to the apex it measures five and one-half inches, three and one-half inches across its broad surface, and it is two and one-half inches in thickness. In men its average weight is 11 ounces; in women, nine ounces. It is situated in the chest cavity between the lungs and reaches upward to the second rib. About two-thirds of its mass lies to the left of the middle line of the body. The upper part points upward, backward and to the right; the lower end points downward, outward and to the left, the tilt being nearer horizontal than vertical.

The heart is made of muscular fibers and is enclosed in a sac of serous membrane, called the pericardium. It is divided into four cavities, or chambers, the right and the left auricle above, and the right and the left ventricle in the apex below. Separating the right from the left chambers is a muscular partition, called the septum. The blood is forced by contracting muscles from the left ventricle into large arteries, which carry it to all parts of the body except the lungs. It returns through veins to the right auricle, which contracts upon it, emptying it into the right ventricle. From this chamber it is pumped into other arteries which carry it to the lungs, and thence through pulmonary veins to the left auricle, from which it passes into the left ventricle, the starting point of its journey.

The ventricles, because of their important function as pumps for forcing the blood into the arteries, are constructed of thicker and stronger muscles

than the auricles. When the blood in its course passes from auricles to ventricles, valves at the opening, formed of a thin, strong membrane, prevent its return when the ventricular muscles contract upon it to force it again into the arteries. The valve between the left auricle and left ventricle is the bicuspid; that between the right auricle and right ventricle is the tricuspid. The openings into the arteries are similarly protected by valves in the shape of a half-moon, called semilunar valves. See CIRCULATION.

Heat, a form of energy possessed by a body due to the vibratory motion of its molecules. Heat was once supposed to be a sort of fluid which permeated all bodies in different amounts, thus giving them different degrees of warmth. This fluid was called "caloric," and the name is still found in the term *calorie*. The temperature of a body, usually measured by a thermometer, refers to the degree of heat which it possesses and corresponds to the violence of the vibratory motion of its molecules. The quantity of heat refers to the total energy of the body due to this molecular motion and must not be confused with temperature. Thus a gallon of moderately warm water possesses far more heat (energy) than a cupful of boiling water; and it requires much less heat to raise the temperature of a pound of lead than a pound of water the same number of degrees.

TEMPERATURE. When heat passes from one body to another, the first body is said to be at the higher temperature; hot and cold are relative terms only. Thus a piece of cold iron gives us the sensation of cold because heat passes from our hand into the iron; a piece of wood at the same temperature as the iron does not feel nearly so cold to the hand because the heat of the hand does not so readily pass into the wood, which is a far poorer conductor of heat than the iron is. Again, a piece of iron may feel cold to one whose hand is warm, and warm to one whose hand is cold.

There are two temperature scales in common use, the Centigrade and the Fahrenheit. In the Centigrade scale the temperature of freezing water is taken as 0° C., and that of boiling water at standard atmospheric pressure, 760 millimeters of mercury, as 100° C.; the interval is divided into 100 equal steps called degrees, and these equal steps, or degrees, are continued both below the 0° C. and above the 100° C. points. In the Fahrenheit scale, the two fixed points are taken as 32° F. and 212° F. respectively, the so-called 0° F. being 32° below the temperature of freezing water (See THERMOMETER). From the fact that the pressure exerted by a confined gas (most accurately, hydrogen) decreases 1-273 of its value at 0° C. for each degree it falls in temperature, it is inferred that if this decrease in pressure were continued indefinitely at the same rate, all pressure would cease at —273° C. At this temperature, then, there would be no molecular motion in the gas (which would become solid or liquid at that temperature) and no heat energy, according to the conception of heat stated at the beginning of this article. This temperature is called the absolute zero, and temperatures measured from this point are called absolute temperatures. The lowest temperature yet attained in scientific work is that of frozen helium at —270° C., or 3° C. on the absolute scale.

TRANSMISSION OF HEAT. Heat is communicated in three ways: by conduction, by convection and by radiation.

Conduction is the slow advance of heat in a body, as when one end of an iron bar is put in the fire, the other end, far from the source of heat, also becomes hot. Gold, silver, iron, steel and many other substances are good conductors, while wood, feathers, fur, woolens, air, etc., are poor ones. We wear woolen clothing and furs in winter because they keep the heat of the body from escaping.

Convection takes place in gases and liquids. It is the mechanical motion of the particles caused when the lower, heated particles become lighter and rise, while the colder, heavier ones press down and help to displace them. This

motion is constantly going on in the air of a room or in water being heated.

Radiation is the transmission of heat through space by vibrations of the ether. These ether waves travel very swiftly, their velocity, 186,300 m. per second, being the same as that of light. Heat waves, like light waves, move in straight lines called rays; we feel the heat of the sun or of a fire by means of these waves, and to obstruct them we raise a parasol or hold up a screen. Ether vibrations produce sensible heat only when they are stopped; thus the air between the sun and ourselves is cool, and the glass through which the sunlight passes is cool though the window sill upon which it strikes is warm. Houses are warmed by radiant heat, whose source is a stove, a grate, a radiator, etc., and the radiating body tends to cool to the same extent that the surrounding bodies are warmed. The heat, unless renewed by the addition of fuel, is given off until the temperature of the radiating body is equal to that of its surroundings. Rough surfaces and dark colors generally radiate heat better than do others, for those substances which best absorb heat also radiate it best.

Effects of Heat. Besides the rise in temperature of a body when heated, the chief physical changes produced are expansion, fusion and vaporization. For expansion of solids and liquids, see Expansion; and for expansion of gases, see Gases, Laws of. For fusion and vaporization, see Calorimetry; Evaporation. The chemical changes that result from the application of heat generally come about because many substances chemically inactive at low temperatures, become active and unite at higher temperatures, as coal and the oxygen of the air in ordinary combustion.

Heath, *Heeth,* or **Heather,** *Heth'er,* an Old World shrub of the Heath Family. It is low, with small blunt-pointed leaves that grow in clusters of four, and brilliantly-colored flowers of rose or rose and white. In Europe large tracts are covered with the shrub, and in the spring when the flowers are in bloom the hillsides present a remarkably beautiful appearance. The heather of Scotland has a tough stem and large flowers. A legend connected with it says that in early times the Picts promised life to captive Scots if they would reveal their secret for making a heather drink that was supposed to give them their hardiness and courage; this the Scots refused to do and so were put to death. The beauty of the blossoms and their profusion on Scottish moors have made it familiar in Scotch literature and song. Over 100 varieties of heather grow in Europe and fully 300 more in Africa, but it does not grow in America even under cultivation, the climate being apparently unfavorable.

Heating and Ventilation, that branch of engineering which deals with the practical application of heat and the movement of air, to the designing, making and installing of apparatus for the warming and ventilation of buildings. A heating system should be capable of maintaining an agreeable temperature in the rooms or space contracted for under all conditions of weather. The European standard for temperature in living rooms is about 59° F., while the United States demands about 70° F. A practical heating system must not only provide for the production of the necessary heat, but must furnish the means of transferring and diffusing the heat economically to those portions of a building it is desired to heat. Stoves and fireplaces are located in the rooms to be heated, and, therefore, require no means of transmitting heat. Steam and hot water, however, are conveyed in pipes to coils or radiators in the different parts of a building required to be heated, forming the direct-radiation system; or the radiators may be located at a certain point and employed to heat the air as it passes over them into flues and into the rooms to be heated, forming the indirect-radiation system.

Another indirect-radiation system is that of the common hot-air furnace, in which the air is heated by direct contact with the iron walls of the furnace, and then led through ducts or flues into dif-

ferent rooms of the house. Indirect systems depend for air movement and heat transmission either upon the tendency of heated air, on account of its lightness, to rise, or on some mechanical means like a fan or blower. In all large and successful indirect-radiation systems, fans or blowers coupled to a motor are necessary, since they give a positive movement of heated air and the means by which the ventilation can be accelerated.

The amount of heat produced and circulated depends largely upon the losses in transmission through the ducts and walls, the cooling influences of exposed window surfaces, and also on the heat required to warm the fresh air continually required for ventilation. It is a difficult matter to figure exactly the amount of fresh air required. A common rule is to figure about 40 cu. ft. per minute for each occupant of a room, but in hospitals and churches this amount might be doubled. Dwellings and buildings not occupied by many persons may have sufficient fresh air supplied by natural ventilation, that is, by the ordinary drafts through doors and windows, but for buildings, such as schoolhouses, theaters, churches and hospitals, which are occupied by a large number of persons, a method of forced ventilation must be provided. This is sometimes accomplished by drawing out the impure air, but it can be performed best by forcing in fresh air by means of a blower. This is known as the plenum system, and as it can be made also to transmit the heat by exhausting air from steam coils, it is the system most generally adopted for the heating and ventilation of large buildings, factories and schoolhouses.

The hot-air furnace is less expensive to install than either a steam or a hot-water system, and the steam is cheaper than the hot water, but in economy of fuel the hot water is the least, with steam next, and hot air the most expensive in operation. The direct-radiation system is cheaper to operate than the indirect, but costs more for installation. Heating by the electric current is not in general use on account of its expense, as not more than five per cent of the heat of the fuel required to produce it is utilized, but owing to its convenience it is extensively employed on electric street cars. See STOVE; FURNACE; FAN; BOILER.

He'be, in Greek myths, goddess of youth, daughter of Jupiter and Juno, and wife of Hercules after he was placed in the skies. She was divine cupbearer, an office which she either resigned on her marriage, or lost because of an awkward fall while serving nectar. Ganymede was her successor. Hebe is represented as very beautiful, flower-decked and bearing a goblet.

He'ber, Reginald (1783-1826), an English bishop and hymn writer, born in Malpas, England. He studied at Oxford, was admitted to holy orders in 1807 and was Bishop of Calcutta from 1823 until his death. Aside from his active work in spreading the cause of Christianity throughout the East by establishing churches and colleges, he became known as a writer of some of the best hymns in the English language. They include *Brightest and Best of the Sons of the Morning, By Cool Siloam's Shady Rill, Holy, Holy, Holy! Lord God Almighty! From Greenland's Icy Mountains* and *The Son of God Goes Forth to War.*

Hébert, *A"bar,'* **Louis Philippe** (1850-), a Canadian sculptor, born in the Province of Quebec. When 19 he went to Rome as a pontifical zouave, and he subsequently prepared for his profession in Montreal and in Paris. For some time he was professor of modeling, Association of Arts and Manufactures, Montreal, and he is the recipient of numerous prizes and honors, including admission to the French Legion of Honor. His best-known works comprise the De Salaberry Monument, Chambly, P. Q., monuments of Cartier, Mackenzie, Macdonald and Queen Victoria, all of which are in Parliament Square, Ottawa, the Laval Monument, Quebec, and the Howe Statue, Halifax.

He'brews. See JEWS.

Hebrews, Epistle to the. See PAULINE EPISTLES.

Hebrides, *Heb' ri deez,* or **Western Isles,** a group of islands off the western coast of Scotland. Of the 521 islands, about 120 are inhabited. The separate islands are noted for their lofty mountains, rugged peaks and hillsides, caverns, ruins and historical associations. The principal industries are fisheries, the manufacture of kelp and the rearing of cattle, ponies and sheep. The islands were colonized in the ninth century and Gaelic is the language principally spoken. Population in 1901, 95,739.

He'bron, an ancient city of southern Palestine, 21 m. s.w. of Jerusalem. Its original name was Kirjath-Arba, its present one is El-Khalil. It is located in the hill country of Judea, about 2800 ft. above the Mediterranean, and on the eastern side of the plain of Mamre. Abraham sojourned here, and David was here crowned King of Israel. Absalom first set up his standard of revolt at Hebron. The present town contains the Mosque of El Haran, supposed to be built over the cave of Machpelah, the burial place of Abraham and his family. Since 1187, when the city fell into the hands of Mohammedans, the place has been considered a sacred spot by them. Population, about 20,000.

Hecate, *Hek' a te,* an evil-working deity of extensive powers, identified with Diana and Proserpine, being a representation of the terrors of night, as well as infernal goddess of witchcraft. Lonely, each night, she roamed the earth, seen only by dogs, which barked at her coming. Eggs and puppies were sacrificed to her on the 30th of each month. Statues of Hecate, dog-headed, were set up in market places and at cross-roads.

Hectograph, *Hek' to graf.* See COPYING DEVICES, subhead *Hectograph.*

Hector, *Hek'ter,* according to Greek myths, the son of Priam and Hecuba, and the most valiant of all Trojan chiefs in the war against the Greeks. He was appointed commander of the entire Trojan force, and was long the bulwark of his native city, the Fates having decreed that Troy would not fall so long as Hector lived. After the death of Patroclus, whom Hector had slain, the Greeks under Achilles made a powerful rally against that hero, and, aided by Minerva, they were successful. The body of the dead Trojan, killed by Achilles, was attached to the chariot of Achilles, and thus not only dragged to the Grecian fleet, but thrice each day, for 12 days, was hauled around the tomb of Patroclus. During this time the corpse was preserved from corruption by Venus and Apollo, and was at last ransomed by Priam, who appealed to Achilles in person. Hector is one of the most attractive warriors of the *Iliad.*

Hecuba, *Hek' u ba,* a Phrygian, second wife of Priam, King of Troy. Among their 19 children were Hector, Paris, Troilus and Cassandra. When Troy fell, Hecuba became the sport of Ulysses. Crazed by the immolation of her daughter, Polyxena, and by the murder of her son, Polydorus, she threw herself into the Hellespont.

HEDGEHOG

Hedgehog, *Hej' hog",* an Old World Mammal of the Hedgehog Family. It is an insect-eating animal, making its nest in thickets and wandering by night in search of its prey. Its nose is long and of use in rooting for the earth-dwelling insects upon which it feeds. The hair upon its back is stiffened and elongated into prickles; when terrified the hedgehog rolls itself into a compact ball with the prickles presented to the enemy, and the longer the attack from an enemy continues the tighter the ball is rolled. In the United States the por-

cupine is frequently spoken of as a hedgehog because of its spiny quills. See PORCUPINE.

He'donism (from Greek *hedone,* pleasure), the name applied to any ethical system which makes pleasure or happiness the highest human good. In ancient times many of the Sophists were hedonists, as were the Cyrenaics and the Epicureans. Modern hedonism differs from the ancient in that the latter was concerned chiefly with the happiness of the individual, while the modern doctrine concerns itself with the happiness of the community. See CYRENAICS; EPICUREANISM; UTILITARIANISM.

Hegel, *Ha' gel,* **Georg Wilhelm Friedrich** (1770-1831), a famous German philosopher, born at Stuttgart, and educated in the University of Tübingen. After finishing his course in 1793 he was private tutor for eight years, first in Switzerland and afterwards at Frankfort-on-the-Main. Resolving to devote himself to philosophy, he became privat-docent in the University of Jena in 1801. Here he lectured until 1806, when he completed, in the confusion of the bombardment of Jena, his *Phenomenology of Mind,* which he afterwards refers to as his "voyage of discovery." After editing a political paper for a year or two at Bamberg, he was rector of the gymnasium at Nuremberg from 1808 until 1816. During this time he married, and wrote his *Logic.* He became professor of philosophy at Heidelberg in 1816, and the following year published his *Encyclopedia of the Philosophical Sciences,* in which he first developed his complete system. But his fame more particularly dates from his call to the chair of philosophy at Berlin, where he succeeded Fichte in 1818. Here he gathered about him an enthusiastic company of students and disciples, lectured upon almost every branch of knowledge and founded a widely influential school of philosophy. His manner as a lecturer was hesitating and unadorned, but characterized by profound thoughtfulness. In 1830 he became rector of the university.

Hegel's philosophy can best be understood in the light of his relation to Kant. Kant had held that all knowledge is the product of two factors: the external world of "things in themselves" which furnishes the data of knowledge; and the knowing mind which provides the forms or categories that make this material intelligible as experience. Hegel drops out Kant's world of "things in themselves," and makes the world of reason inclusive of the whole of reality. "Discover the secret of reason and you have discovered the secret of the universe." Our ethical ideas, according to Kant, cannot be *known* but must be *believed* or *postulated.* This contrast of ideal and real disappears in Hegel. Faith, if brought to a clear self-consciousness, becomes a knowledge of the true self, that is, the Absolute. For Kant, all knowledge is relative; for Hegel absolute knowledge is possible, because whoever knows the true nature of mind finds therein the expression of the Absolute.

Hegel's philosophy may be characterized, in another way, as absolute idealism, in further development of the subjective idealism of Fichte and the objective idealism of Schelling. In its inclusion of all life and its interpretation of history it was immensely suggestive and exerted a profound influence upon contemporary German thought. While its direct influence has largely passed, its indirect influence is still very great, especially in England and America. Hegel's works, published in 19 volumes, include *Phenomenology, Logic, Encyclopedia, Philosophy of Rights, Philosophy of History, Æsthetics, Philosophy of Religion* and *History of Philosophy.* See KANT, IMMANUEL; FICHTE, JOHANN GOTTLIEB; SCHELLING, FRIEDRICH WILHELM JOSEPH VON.

Hegira, *Hej' i ra,* the name given the flight of Mohammed from Mecca to Medina to escape the persecution of his kinsmen. This event marks the beginning of the Mohammedan Era. The Moslem calendar was instituted 17 years later by Omar; the first day of the year in which the flight took place (corre-

sponding to July 16, 622, of the Christian Era), is reckoned the first day of the Mohammedan year.

Heidelberg, *Hī' del berk,* a city of Germany situated in Baden on the left bank of the Neckar, 32 m. n.e. of Karlsruhe. The city has a beautiful site and is surrounded by vineyards and wooded hills. It is divided into the old and new sections. The former is characterized by narrow streets and old buildings; the latter, which is the residential section, is a modern city. The ruins of the old castle formerly the residence of the electors of Palatine, surmount a height 300 ft. above the town. Population, about 40,000.

Heidelberg, University of, a university at Heidelberg, Germany, founded in 1386 by Rupert I. It is the oldest German university within the boundaries of the present empire. For the first 300 years of its existence the university was prosperous, but from 1630 to 1800 it suffered from religious and political dissensions and was several times compelled to suspend. In 1803 its endowment was restored and since then it has prospered. The university maintains departments of law, medicine and philosophy, which includes arts and sciences. The library contains over 500,000 volumes. There are about 1500 students, among whom are a goodly number from the United States.

Heine, *Hī' ne,* **Heinrich** (1797-1856), a German poet, born in Düsseldorf. He entered the University of Bonn in 1819, studied in Berlin and Göttingen, and before taking his degree in 1825 made a tour to the Harz Mountains, visiting Goethe at Weimar. From 1826 to 1831 he produced some of his finest work. He visited London and made an extended tour through Italy. The Revolution of 1830 found him writing ardent poems of democracy, and in 1831, fearful for his safety, he went to Paris, where he lived the rest of his life.

Heine was a journalist and political writer of distinction, often indulging in brilliant, well-directed wit and satire. As a poet he was a lyricist, singing in tender strains of the passionate sorrows of his own heart, or of the charm and majesty of sea and coast. He broke away from the extremes to which Romanticism had been carried in Germany, his verse revealing greater spontaneity and deeper feeling. Best known are the collections *Pictures of Travel, Book of Songs, Winter's Tales;* also *New Songs, The Newer Literature of Germany, Conditions in France* and *Last Poems and Thoughts.*

Heintzelman, *Hīne' tsel mahn,* **Samuel Peter** (1805-1880), an American soldier, born in Lancaster County, Pa., and educated at West Point. He served on the frontier, in various Indian campaigns and in the war with Mexico, following which he commanded the Southern District of California. He became brigadier-general of volunteers at the outbreak of the Civil War. He was division commander under McDowell at Bull Run, where he was severely wounded, was corps commander in the Peninsula Campaign, had charge of Pope's right wing at the second engagement of Bull Run and later commanded the defenses of Washington. In 1864 he was in charge of the Department of the West, and in 1869 he retired as major-general.

Heir, *Air,* in law, the one to whom the real estate of a deceased person passes. A legal heir is one to whom the property passes by descent, and in the United States this is the person nearest of kin to the deceased person. In most European countries it is customary for the estate to descend to the eldest son, but in the United States the property is equally divided among the children unless otherwise disposed of by will.

Hel'en, in classical mythology the most beautiful woman of her time, daughter of Leda by Jupiter, and sister of Castor and Pollux. She was wooed by the bravest heroes of Greece, all of whom vowed, at the suggestion of Ulysses, to respect her free choice of a husband, and to champion her cause forever. Helen married Menelaus, with

whom and their daughter Hermione, she lived happily until Paris came, and, aided by Venus, enticed her away. Paris was killed in the ninth year of the Trojan War, and Helen married his brother, Deiphobus, later betraying him to the Greeks. At the close of the war Helen was reunited to Menelaus. They returned to Sparta, ruling peacefully there until the King's death, when Helen retired to Rhodes, where she was murdered. See TROJAN WAR.

Hel'ena, Ark., a city and the county seat of Phillips Co., about 65 m. s.w. of Memphis, Tenn., on the Mississippi River and on the St. Louis, Iron Mountain & Southern, the Yazoo & Mississippi Valley, the Arkansas Midland and other railroads. The city occupies "made land" in the Mississippi bottoms, but is protected by levees. The chief economic interests are centered in the manufacture of cotton and lumber products and shipping. Helena was settled in 1821. It was a point of strategic importance during the Civil War. Population in 1920, U. S. Census, 9,112.

Helena, Mont., the capital of Montana and the county seat of Lewis and Clark Co., situated in the west-central part of the state in Prickly Pear Valley, 80 m. n.e. of Butte and about 18 m. w. of the Missouri River. It is entered by the Great Northern and the Northern Pacific railroads. The city itself was originally a mining camp, and its streets, though now well cared for, are often irregular and uneven. There are many pleasing public buildings, among which are the capitol, the courthouse, a United States assay office, the Cathedral of St. Helena, the Federal Building, a public library, the Montana State Library and a state law library. The homes of Helena and the business houses are modern and attractive, and the city is one of the wealthiest of the United States. The public school system of Helena has been well planned and is housed in excellent buildings. The city is also the seat of the Montana Wesleyan University, Mount St. Charles' Catholic College and St. Vincent's Academy.

The country surrounding Helena is not only advantageous for agricultural pursuits, but abounds in minerals, especially in copper, gold- and silver-bearing quartz and in phosphates, oil, marble, slate and cement. Through the heart of the city runs the famous Last Chance Gulch, from which gold to the value of over $40,000,000 has been taken. Aside from this source of wealth the city also has extensive railway shops, smelters, quartz crushers and manufacturing plants. The electric-lighting plant and street-railway system have their power plants on the Missouri River, 18 m. distant, and another power plant is situated 20 m. north of the city. Ft. Harrison is a near-by military post.

Helena was first the camp of four discouraged prospectors who had been unlucky in their search for gold and named this location Last Chance Gulch. It proved a rich field, and a placer mining camp was at once established. The town was platted in 1864, and when Montana Territory was organized Helena became its capital. The city has been burned twice. Its present charter dates from 1881. Population in 1920, U. S. Census, 12,037.

Heliopolis, *He" li op' o lis,* (City of the Sun), one of the largest and most ancient cities of ancient Egypt, was situated a little north of Memphis. It was noted as a religious center and for its school which Plato is said to have visited. The Pillar of On, 67½ ft. high and 6 ft. broad at the base, is near the city, and the obelisks known as Cleopatra's Needles, one of which is now in New York, formerly stood there. On its site is the modern village of Matariah.

He'lios, in Greek myths the sun god, offspring of Hyperion and Thea. He daily drove his flaming chariot across the sky from Oceanus in the east, to his western palace. His most celebrated children were Aëtes, Phaëthon and Circe. He was originally worshiped in Asia. Rhodes honored him with a yearly festival, her Colossus being his representation. Helios and Apollo are frequently confused.

He'liostat", an instrument for keeping a reflected beam of sunlight in the same position as the sun moves. It consists essentially of a mirror mounted so that it is gradually turned by clockwork and thus always reflects the sunlight in the desired direction. Some forms are made with two mirrors, the light being reflected from the first mirror in a direction parallel to the earth's axis and then reflected by the second mirror in the desired direction. The term *siderostat* is applied to a similar instrument for reflecting the light from a star in any desired direction.

He'liotrope. See BLOODSTONE.

Heliotrope, a fragrant, old-fashioned flower of the Borage Family, grown in flower gardens. There are several species, the most of which are delicate herbs that grow from one to two feet high and bear a spike of small, white or purple flowers, having so pleasing a fragrance that they are used in preparing perfumes and sachet powders. The flowers have a tiny, five-parted calyx and a five-lobed, tubular corolla; they generally grow upon but one side of the stalk.

Wild heliotrope is found along the sandy shores of eastern United States. It has long, hairy stems and forked spikes of blossoms. The shrub heliotrope is a greenhouse plant introduced from Peru. The name heliotrope is applied to the light purple shade common to heliotrope blossoms.

Hell, the term used generally to designate the abode of devils and the souls of the wicked. In the Authorized Version of the Bible *hell* is used as an equivalent of the Greek *Hades* and of the Hebrew *sheol* and *Gehenna*. *Sheol* and *Hades* seem originally to have designated the place of the dead, without reference to its character. In the Revised Version of the New Testament the word *Hades* is left untranslated, while *Gehenna* is translated hell.

Hell-Diver, Dabchick or **Pied-Billed Grebe,** a diving bird of the Grebe Family, about 15 inches in length, with blackish upper parts, mottled silvery breast, black chin and throat and a black band across the white bill. The nest is a mass of plant stems, either floating or anchored to rushes, and contains four to eight dirty-white eggs. The hell-diver is a familiar bird in the ponds of most parts of North and South America. It is one of the best of the divers. The young are downy and the head and neck are marked with brown, black and white.

Hel'le, daughter of mythical Athamas and Nephele, and sister of Phryxus. Athamas wearied of his wife and took another. Nephele, fearing for her children under a stepmother, then appealed to Mercury, who gave her a golden-fleeced ram which would carry brother and sister to safety. In a wild flight east, Helle fell from the ram's back into the sea, which was named for her, Hellespont; now the Dardanelles.

Hel'lebore, a poisonous herb of the Buttercup, or Crowfoot, Family, having a colorless, bitter juice. It is native in European countries, but has been naturalized in the United States. The stem is thick, and grows to a height of two or three feet, bearing many large, divided leaves at the base of the stem and a few smaller ones above. The flowers are large and nod on slender stalks. They have five greenish sepals and eight or ten short, irregular petals. Black hellebore, a powerful poison, is derived from the roots.

False hellebore, or Indian poke, and white hellebore are both members of the Lily Family. They are long-stemmed plants with stiff, deep-veined leaves which clasp the stems, and small, dull green flowers clustered upon a long spike. The blossoms have six petal-like sepals and six stamens, but are much less attractive than the foliage. White hellebore is the source of the white powder of the same name, used as an insecticide.

Hel'lespont. See DARDANELLES, *Dahr" da nelz'*.

Hell Gate, a part of East River, New York, having Wards Island at its northern extremity and Blackwells Island at its southern. The rocks and reefs, which rendered the passage dangerous and

which made its name seemingly appropriate, were removed by the Federal Government in 1885. Their removal also did away with the swift currents and eddies that had been a menace to navigation. See EAST RIVER.

Hel'met, a piece of armor for the head. Helmets have been in use from the earliest times and have differed greatly in shape, from the high-crested helmet of the Greeks to the skullcap of the Assyrians. The basinet of the 14th

HELLEBORE

century had a pointed visor perforated with many holes to admit the air. The visors were hinged at the sides near the ears and could be raised and lowered at will. Many helmets were highly decorated, especially those used in heraldry.

Helmholtz, *Helm' holts,* **Hermann Ludwig Ferdinand von** (1821-1894), a German physician and physiologist, born at Potsdam, Germany. He received his early education in Potsdam and studied medicine in Berlin. From 1843 to 1847 he served as surgeon in the army, after which he became assistant in the Berlin Anatomical Museum. He occupied positions as professor of physiology at Königsberg from 1849 to 1855; at Bonn from 1855 to 1858; and at Heidelberg from 1858 to 1871, leaving Heidelberg to become professor of physics in the University of Berlin. Helmholtz was for several years president of the physical section of the Academy of Sciences, and was honorary president of the International Congress of Electricians held in Chicago in 1893. Helmholtz invented the ophthalmoscope for examining the interior of the eye, and to him is attributed the now generally accepted theory of color, as well as many valuable discoveries in physics and numerous practical inventions. The Emperor of Germany conferred the title of nobility upon him in 1883. He visited the United States in 1893, and died in Berlin the following year.

Helvetii, *Hel ve' shy i,* an ancient Celtic people who lived in what is now western Switzerland. As they were hard pressed by the Germans and felt they were too numerous for their narrow bounds, they tried to settle the region to the south while Cæsar was governor of Gaul. He defeated them in battle and sent them back as a barrier against a German invasion of Gaul. After the eastern frontier was extended, the country was Romanized, roads were built, commerce developed and the Roman religion supplanted the old Celtic faith. The Alemanni overran the country from 260 to 268 A. D., and it never was as prosperous again while under Roman rule.

Hem'ans, Felicia Dorothea (1793-1835), an English poet, born in Liverpool. Her first volume of poems, entitled *Juvenile Poems,* appeared in 1808. She married in 1812, and six years later Captain Hemans removed to Italy, leaving Mrs. Hemans and their five children in the care of her mother. Through

Bishop Heber and others she was influenced to continue her writing, and produced the tragedy *The Vespers of Palermo,* which was presented successfully in the Edinburgh theater. In 1829, on a visit to Scotland, she became acquainted with Sir Walter Scott at Abbotsford, and met Wordsworth at Rydal Mount, in England, the following summer. Both poets recognized in her verse its lyrical and imaginative qualities. She wrote *Hymns for Childhood, Scenes and Hymns of Life, Lays of Many Lands, Records of Woman* and *Songs of the Affections.* Among single poems are *Casabianca, The Better Land, The Homes of England, The Palm Tree, The Wreck* and *Landing of the Pilgrim Fathers in New England.*

Hem'atite, a common ore of iron, widely distributed and occurring in large quantities in massive and in crystallized form in igneous and stratified rocks. Red hematite has a brownish-red or black color, is an important mineral containing a large percentage of iron and constitutes the chief source of supply for iron and steel. Specular iron, another variety, characterized by lustrous crystals, is found in crystalline and metamorphic rocks. The chief sources of hematite are in the Lake Superior region of North America. See IRON AND STEEL.

Hemiptera, *He mip' ter a,* a group of Insecta, including the cicadas, water bugs and water scorpions. The members of the class have sucking mouth parts and do not in their life history pass through all the stages common to most insects. The name of the group means half wing and refers to the two different textures in the forewings of such representatives as the squash bug. There are two main divisions of the group, and together they include the most curious and destructive of the insects. See CICADA; INSECTA; CHINCH BUG.

Hem'lock, a dark, beautiful tree of the Pine Family, cultivated for ornament and found growing in groves and forests in eastern United States, principally in the Alleghenies. The trunk is straight, with a buttressed base, and is covered with a furrowed red bark valuable to tanneries. The wood is soft, coarse grained and light, and useful in general construction work. The branches are horizontal, but droop at the ends in a graceful manner. The flowers, which are inconspicuous, develop short, plump, cones, green or purple at first, but becoming reddish-brown and opening in roselike form to discharge their tiny seeds. The most common hemlocks of the United States are the Canada, the Carolina and the mountain hemlocks, all of which occur in thick groves or in single specimens in company with oaks, hickories and other pines.

Hemlock, Poison, a species of poisonous plants of the Parsley Family found in Europe, Asia and America. The name is the same as that given it by the ancient Greeks, who used it as a means of putting to death condemned criminals; Socrates was probably the most illustrious of those who suffered by this means. All of the poison hemlocks resemble the wild caraway in appearance and thus are particularly a source of danger. The stems are slender, and, unlike those of the caraway, are striped, or marked with reddish lines. The leaves are made up of palmlike leaflets which spread quite flat and have finely-toothed margins. The inconspicuous flowers grow in a branched, smooth-topped cluster of greenish blossoms almost identical with the caraway in appearance. The seeds are small, flat on one side and ribbed on the other, but not hooked as are those of the caraway. The seeds yield an oil which, though poisonous, is used in small quantities in sedative medicines. In cases of hemlock poisoning a doctor should be summoned, and emetics given or a stomach pump used.

Hemp, a name given commonly to a number of fiber-producing plants, but botanically applied only to a coarse member of the Nettle Family. The plant itself is rough, with an erect stem, generally growing from four to ten feet high, but under cultivation occasionally attaining a height of 20 feet. The leaves

are large and are made up of from five to nine, spreading leaflets which meet at the top of the stem and are finely-toothed. The flowers upon one plant are staminate, that is, they contain the stamens with the fertilizing dust, and those upon another plant are pistillate and will bear the fruit. The staminate flowers grow in large, yellowish clusters, but the pistillate are tiny and inconspicuous. Hemp is cultivated in India for its production of a narcotic drug called hashish (See HASHISH), but it is raised chiefly for its long, soft fibers from which coarse cloth and rope are made. For this latter purpose the fields of hemp are cut when the seeds ripen, which is about three and a half months after seeding. The stalks are first bundled and dried, then retted, or rotted, to remove any gum from the fibers. When the gum is entirely rotted away, they are again dried either by the sun or by artificial means and the external bark is removed. This leaves the fibrous inner bark ready for spinning.

Hemp is raised in widely differing climates since it is hardy as long as it is not touched by the frost. In the United States it is produced in quantity in Illinois, Missouri, Kentucky and California, and elsewhere, in Brazil, Russia, the Philippines and Italy; that of the fields of Italy is the softest and the finest. In some places in Europe the hemp is used as a hedge plant, for though it is rough, its form is regular and its leaves are pleasing to the eye. See SISAL; MANILA.

Hen. See FOWL, DOMESTIC.

Hen'derson, Charles Richmond (1848-1915), an American sociologist and social worker, born at Covington, Ind. He graduated from Chicago University in 1870, from the Union Theological Seminary in 1873 and from the University of Leipsic in 1901. From 1873 to 1892 he was pastor of the Baptist churches at Terre Haute, Ind., and Detroit, Mich. In 1892 he was elected assistant professor of sociology at the University of Chicago, became full professor in 1897, and was made head of the department of ecclesiastical sociology in 1904. Dr. Henderson was especially active in charitable and social reform movements and he served on many commissions organized for this purpose. His writings include *An Introduction to the Study of the Dependent, Defective and Delinquent Classes, Social Elements, Social Settlements, Modern Prison Systems, The Social Spirit in America* and *Modern Methods of Charity*.

Henderson, Ky., a city and the county seat of Henderson Co., about 142 m. s.w. of Louisville, on the south bank of the Ohio River and on the Louisville & Nashville, the Illinois Central, the Louisville, Henderson & St. Louis and other railroads. It has steamboat service to Louisville, Evansville, Ind., Cairo, Ill., Memphis, Tenn., and New Orleans, La. Indian corn and stemmed tobacco are shipped in large quantities. Bituminous coal is mined in the vicinity. The factory products include cotton and woolen goods, soft drinks, furniture, flour, hominy, meal, cigars and tobacco, brick, ice and baskets. The city has a well-equipped sanatorium, a Carnegie library, fine school buildings, a magnificent bridge across the river, and Atkinson Park. County fairs are held in grounds near the city. On the site of Henderson the first permanent settlement was made in 1784 and called Red Banks. The town was laid out in 1897 and named in honor of Richard Henderson; the place was incorporated as a town in 1810 and first chartered in 1854. In 1905 the adjoining towns, Edgewood and Audubon, the latter named for the naturalist who lived here for a time (See AUDUBON, JOHN JAMES), were annexed. Population in 1920, U. S. Census, 12,169.

Hen'dricks, Thomas Andrews (1819-1885), a vice-president of the United States, born near Zanesville, Ohio, but taken by his parents to Indiana when six months old. He graduated from South Hanover College in 1841; was admitted to the bar in 1843; was elected to the State Legislature of Indiana in 1845; and served in Congress from 1851

to 1855. During the next four years he was commissioner of the United States land office. He became a member of the United States Senate in 1863, and in 1872 was elected governor of Indiana. In 1884 he was elected vice-president of the United States on the ticket with Grover Cleveland. He died during his first year in office.

Hen'gest and Hor'sa, brothers who headed the first Saxon bands settling in England. Some time between 428 and 455 they landed at Ebbsfleet, Kent, their aid against the Picts having been sought by the British ruler, Vortigern, and the Island of Thanet became their home. Through quarrels with their British allies, they came to possess the Kingdom of Kent. The *Anglo-Saxon Chronicle* mentions a battle at Ægæls threp, 455, against Vortigern, wherein Horsa was slain. By two or three subsequent engagements the British were wholly expelled from Kent, Hengest ruling till 488, and his son, Æsc, who succeeded him, until 512.

Hen Hawk. See HAWK.

Hen'nepin, Louis (about 1640-1706), a Belgian missionary and explorer in America, born at Ath, in Hainault. At an early age he joined the Franciscan Order. In 1675 he came to Canada in the same ship with La Salle, whom, in 1678, he accompanied on his last expedition to the upper Great Lakes. Leaving La Salle after Ft. Crèvecœur had been founded on the Illinois River, Hennepin and a few followers pushed on to the Mississippi. Here he was captured by the Sioux, who carried him to the present site of Minneapolis, where he saw the Falls of St. Anthony. Returning to Quebec and subsequently to France, he was ordered back to America. Refusing to obey, he fled to Holland. He died in Utrecht. He was the first to give a written account of the existence of coal in America.

Hennepin Canal. See ILLINOIS AND MISSISSIPPI CANAL.

Henry, the name of eight kings of England. HENRY I (1068-1135), the youngest son of William the Conqueror, had himself proclaimed king in 1100, upon the death of William Rufus, in the absence of his older brother Robert. He conciliated the Scotch by marrying Matilda, the daughter of their ruler. He was successful in wars with Normandy and France.

HENRY II (1133-1189), the son of Geoffrey Plantagenet and Matilda, daughter of Henry I, became the first king of the Plantagenet line in 1154. His reign is noteworthy for the conflict with Thomas Becket over the relation of Church and State; for the first conquest of Scotland by England; for an improved judicial system, including the revival of trial by jury; and for the subjugation of the lawless barons. He ranks among the great kings of England.

HENRY III (1207-1272), grandson of Henry II, succeeded his father, King John, in 1216, at the age of ten, and reigned for 56 years. He was not a strong king and the great barons took occasion to assert themselves. The modern English Parliament of two houses had its beginning in this reign.

HENRY IV (1367-1413), son of John of Gaunt, who was the fourth son of Edward III, was the first king of the House of Lancaster. He succeeded to the throne in 1399 upon the abdication of Richard II. His reign was characterized by numerous insurrections, oppressive taxation and the persecution of the Lollards.

HENRY V (1387-1422) succeeded his father Henry IV in 1413. The next year he laid formal claim to the French crown and invaded France with 30,000 men. On Oct. 25, 1415, he routed the French at Agincourt (See AGINCOURT, BATTLE OF), and became Regent of France and heir to the throne. He made a second successful invasion of France in 1417, and while engaged in a third invasion died from sudden illness.

HENRY VI (1421-1471) succeeded his father Henry V at the age of nine months. His uncle, the Duke of Bedford, became governor of France, and his uncle, the Duke of Gloucester, pro-

tector of England. In 1429 he was crowned at Westminster and two years later at Paris. Immediately a war with France began, in which, under the inspiration of Joan of Arc, England was deprived of all her possessions in France except Calais. The Wars of the Roses began in this reign. Henry was several times taken prisoner and was found dead in the Tower in 1471. See ROSES, WARS OF THE.

HENRY VII (1457-1509), first sovereign of the Tudor line, was descended from John of Gaunt, Duke of Lancaster. He defeated Richard III on Bosworth field and succeeded him in 1485. By his marriage with Elizabeth of York he united the warring houses of Lancaster and York. Henry inaugurated the Tudor policy of curbing the nobility in the interests of the Crown, which led to temporary loss of popular liberty. See HENRY VIII.

Henry VIII (1491-1547), King of England. Upon the death of his father, Henry VII, in 1509, he succeeded to the throne at the age of 18, an energetic, headstrong, handsome youth, immensely popular with his subjects, uniting in himself, through his mother, the rival lines of Lancaster and York. During the first 20 years of his reign his chief adviser was one of the greatest political geniuses of England, Thomas Wolsey, lord chancellor and cardinal. Their foreign policy was for England to maintain the balance of power between Francis I of France and Charles V of Spain and Germany, the two great political factors at that time, on the Continent. The domestic policy of Henry and Wolsey was to overcome the remnants of feudalism, the influence of the nobles and the liberties of Parliament, by centralizing all power in the throne.

A further important development of Henry's reign was the separation of the English Church from Rome. This did not take place as a religious movement, but in connection with Henry's divorce from his first wife, Catharine of Aragon. The Pope refused to grant the decree, Wolsey was degraded because of lukewarmness in the matter and Henry followed the bold advice of his new councilor, Thomas Cromwell, that he should break with the Pope and secure the divorce through his own courts. The separation from Rome was accomplished by two acts of Parliament, one in 1534 setting aside the papal authority, and another in 1535 declaring Henry head of the Church of England. The marriage with Catharine was then annulled by a court formed by Thomas Cranmer, who had been created Archbishop of Canterbury. Henry further weakened the power of Rome, at the same time strengthening his own power and establishing the new Church, by the suppression of the monasteries and the desecration of the sacred shrines, and by using the wealth thus acquired to found schools and colleges, to establish new bishoprics, and to divide estates among his favorites.

After his divorce from Catharine, Henry married Anne Boleyn, who became the mother of Elizabeth, the future queen. After a few months Anne was sent to the block on a charge of infidelity, and Henry married Jane Seymour, who became the mother of Edward VI. She soon died, and Henry married Anne of Cleves, whom he shortly divorced, at the same time executing Cromwell, who had brought about the union. Catharine Howard, Henry's fifth wife, was executed on a charge of infidelity, and he married Catharine Parr, who survived him. He reigned for 38 years and died unmourned by his people.

Henry IV (1050-1106), Emperor of the Holy Roman Empire from 1056 until 1105. He was crowned at Aix-la-Chapelle upon the death of his father and ruled until 1066 under the regency first of his mother and later of various advisers. After assuming the control of the government, Henry aroused the enmity of Bavaria, Thuringia and Saxony by his heavy taxes, and for several years gave his time to subduing those states. In the meantime papal authority and royal authority had begun to conflict to such an extent that in 1076 the Emperor

called a council which deposed the Pope. In reply the Pope excommunicated the Emperor. Finding his support gradually dropping away by this move, Henry followed the Pope to Canossa and, as a penitent, sought absolution. Henry, however, did not regain his authority, and after the election of several antipopes by one party and the appointment of several anti-kings by the other, Henry, through the revolt of his son, was forced to abdicate. He died the following year.

Henry IV (1553-1610), King of France from 1589 until his death. He was the son of Anthony of Bourbon, Duke of Vendôme, and of Jeanne d'Albret, Queen of Navarre. Through the efforts of his mother he was educated as a Protestant in the College of Navarre at Paris. Henry became King of Navarre upon the death of his mother in 1572, and in that same year he married Margaret of Valois, the sister of Charles IX, the young King of France. Henry escaped the massacre of St. Bartholomew's Day only by a hurried renunciation of his religious beliefs. Four years later, after several ineffectual attempts to escape from court, Henry succeeded in getting to Tours, where he became the leader of the Huguenot forces in the religious wars that followed. Through the death of Henry III he became King of France, although he was not fully acknowledged until nine years had elapsed. Through the battles of Arques and Ivry, the sieges of Paris and of Rouen, and the final conversion of Henry to Catholicism, France came wholly under his control. The same year, 1598, which marked his full accession, saw the promulgation of the Edict of Nantes, granting religious liberty to Protestants. See NANTES, EDICT OF.

From that time on Henry labored for the prosperity of France. He encouraged agriculture and manufactures and reformed civic affairs in the various provinces. He was a patron of arts and letters and built a great part of the Louvre, the Pont Neuf, the Hôtel de Ville and the Place Royale, besides finishing the Tuileries. Through the advice of his minister Sully he divorced his first wife and later married Maria de' Medici, who became the mother of Louis XIII. On the day after her coronation Henry was assassinated by Ravaillac.

Henry was one of the most popular of French rulers. He was affable, kindly and always pleasing. His courage was unquestioned, which greatly endeared him to his people. He is variously known as Henry the Great, Henry of Navarre and the Regenerator of France.

Henry, Joseph (1799-1878), an American scientist, educated at Albany Academy. Professor Henry was one of the most celebrated electricians of his day. One of his greatest discoveries was the electromagnet, and the fact that such a magnet could be instantly made and unmade by making and breaking the electric current. This discovery laid the foundation for the telegraph. For 14 years he was professor of natural history in the College of New Jersey, when he became the first manager of the Smithsonian Institution (See SMITHSONIAN INSTITUTION). He organized the meteorological bureau, later the government weather bureau, became president of the lighthouse board and founded our lighthouse system. Among Henry's publications is *Contributions to Electricity and Magnetism.*

Henry, O. See PORTER, SYDNEY.

Henry, Patrick (1736-1799), an American Revolutionary patriot, born in Hanover County, Va. He studied law and began to practice in 1760, attaining success from the start. His marvelous powers as an orator first became manifest in the case known as the Parson's Cause in 1763, in which he boldly struck the keynote of the coming Revolution. He was elected to the Virginia House of Burgesses in 1765, and nine days after taking his seat moved a series of resolutions denouncing the Stamp Act and defining the rights of the colony; and he supported these in a speech of such eloquence that Thomas Jeffer-

son said of it: "It was great indeed, such as I have never heard from any other man. He appeared to me to speak as Homer wrote." It was this speech that contained the words: "Cæsar had his Brutus, Charles the First his Cromwell, and George the Third [cries of 'treason'] may profit by their example. If *this* be treason, make the most of it." He was a delegate to the First Continental Congress in 1774, and opened its deliberations with a speech that gained for him the reputation of being the foremost orator in America.

In the Virginia convention in March, 1775, Henry moved to put the colony in a state of defense, and in support of the resolution delivered his famous speech closing with the words: "Give me liberty, or give me death." In 1776, largely through his efforts, the Virginia convention voted unanimously for independence, and he was elected the first governor of the independent state, being reelected four times. As governor he planned and sent out in 1777 the expedition under George Rogers Clark that conquered the vast territory northwest of the Ohio, and forced England to yield it in the treaty of peace, thus securing it to the United States.

He was opposed to the ratification of the Federal Constitution because he thought it jeopardized the rights of the states, and it was largely through his efforts that the first ten amendments were adopted to further protect those rights. He declined Washington's offer of the secretaryship of state and chief justiceship of the United States, and the appointment by John Adams as special minister to France, and retired to private life in 1795.

Hen'ty, George Alfred (1832-1902), an English author and war correspondent, born in Trumpington. He studied at Westminster and Cambridge, served as purveyor in Crimea during the war with Russia, and became war correspondent for the London *Standard*, reporting the Austro-Italian, Franco-German, Turko-Servian, Abyssinian and Ashanti campaigns. As editor of the *Union Jack*, a magazine for boys, he made a success of juvenile fiction, writing over 80 novels of adventure for boys. Among his works in various lines are *A Woman of the Commune, Dorothy's Double, Under Drake's Flag, By Pike and Dyke, The Lion of the North, Out with Garibaldi, The Treasure of the Incas, With Kitchener in the Soudan* and *With Roberts to Pretoria.*

Hepat'ica, or **Liverleaf,** from the shape of its leaf, a low plant of the Crowfoot, or Buttercup, Family. It is one of the earliest spring flowers in the states north of Georgia and often appears before the snow is gone. The thick leaves are evergreen and last through the winter to shield the flower buds, which are also protected by a woolly coat. The fragrant flowers are borne on slender stems proceeding directly from the root, and are surrounded by five little leaflike coverings called bracts. The color of the flower may be white, pink, pale blue or lavender. There are two varieties, which differ mainly in the shape of their leaves, one often growing into the other. One is called the round-leaved hepatica and has three lobes to the leaf; the other, acute-lobed hepatica, has five pointed lobes. The plant is used in medicine.

HEPATICA

Her'aldry, formerly the science of a herald's duties, but at the present time, a knowledge of forms, terms and laws pertaining to the use of coats of arms and similar emblems. The origin of em-

blems to represent families, clans and military organizations is unknown, for they were common among the most ancient nations. But the Crusades introduced them to the Middle Ages. As emblems were necessary to distinguish the leaders of the different troops in the motley assembly which made up the Christian army, the followers of each leader naturally adopted the badge of the one who led them and their badges became family coats of arms, which have been handed down to the present time. The coat of arms consists of a miniature shield so marked and colored as to bring out clearly the emblem of the individual family or clan to which it belongs. While considered of little importance in America, in Europe and Oriental countries coats of arms are given great consideration among the nobility, by whom an infraction of the rules of heraldry is considered a breach of etiquette.

Herb, *Urb,* a name applied to a class of plants which develop more or less fleshy shoots and live only the length of time necessary for the growth and maturing of their fruit. If these plants live but for a year they are called annuals; for two years, biennials; and even though they die down to the ground, if they are renewed each succeeding year from the old root or bulb, they are called perennials. Herbaceous plants may have erect, climbing, twining or prostrate stems which are often fibrous, but are never woody in structure. A familiar example of an herb is found in any of our common weeds, as the shepherd's purse. Opposed to herbs are shrubs, which are bushy, slender, woody plants, and trees, which are the largest woody plants with erect stems.

Her'bart, Johann Friedrich (1776-1841), a German philosopher and educator, born at Oldenburg. He studied under Fichte at Jena, and became his ardent follower, although later he broke away from his system. After tutoring for several years in Switzerland, he became docent in philosophy and pedagogy at Göttingen in 1802, and was appointed professor there three years later. From 1809 to 1833 he was professor of philosophy and pedagogy at Königsberg. He was recalled to Göttingen in 1833, where he continued to teach until his death.

Herbart's philosophy begins with Kant's "world of experience," the common view of things. It is not further connected with Kant, however, but is more closely akin to the "monad" philosophy of Leibnitz, or to the earlier atomistic philosophy. He held that underlying the world of appearances are simple atoms of monads which he calls *reals.* These *reals* disturb each other and react in self-defense. Such reactions are our ideas. Conscious life is the behavior of these ideas toward each other, in conflict when unlike, supporting each other when alike. The central principle of his reasoning is the law of contradiction. What contradicts itself cannot be truly real or actual. Ultimate reality therefore must be unitary and without change. In this he is the opposite of Hegel.

Herbart's greatest influence was in the field of education. In his psychology the ideas already present are called apperceiving ideas, by which new ideas, in turn, are apperceived. The problem of education is to present such new ideas as can be most easily apperceived and incorporated with the old ideas to form knowledge. The education of the individual is to be accomplished by exciting his interest and bringing him into contact with all knowledge as organized in groups of ideas. Apperception involves the twofold process of absorption and reflection, and is to be brought about by observing four stages: clearness, association, system and method. Allowing for what is temporary in Herbart's system, many of its elements are of permanent value and make him the founder of modern pedagogics. His most important educational works have been translated into English. See APPERCEPTION.

Herbert, George (1593-1633), an English poet, born in Montgomery Castle, Wales. He lived a saintly life at

Bemerton, Wiltshire, and in addition to his duties as a priest wrote exquisite sacred lyrics, sometimes artificial, but always full of the spirit of true Christianity. They were published under the title of *The Temple.* An admirable life of Herbert was written by Izaak Walton.

Herbert, Victor (1859-), an Irish-American composer and orchestra conductor, born in Dublin and educated in Germany. His first engagement was as cellist of the Court Orchestra at Stuttgart, and later he held the same place in the Metropolitan Orchestra of New York. He was chosen successor to Gilmore as conductor of the New York Twenty-second Regiment Band, and was conductor of the Pittsburgh Orchestra from 1898 until 1904. Since 1904 he has conducted Victor Herbert's New York Orchestra. His most popularly known compositions are comic operas, among which are *Prince Ananias, Babes in Toyland, Cyrano de Bergerac, The Idol's Eye* and *The Wizard of the Nile.*

Herculaneum, *Hur" ku la' ne um,* an ancient city of Italy, situated 5 m. e. of Naples, at the northwestern base of Mt. Vesuvius. Along with Pompeii and Stabiæ it was completely buried by the eruption of Vesuvius, A. D. 79, and it now lies from 30 to 120 ft. below the earth's surface. Modern villages have been constructed on the site, and as a result excavations are carried on only with extreme difficulty. The first traces of its original site were discovered in 1719. Since 1906 efforts have been made by the Italian Government to make of the buried city an underground museum, rich in remarkable examples of ancient art, and leave the modern village above intact.

Hercules, *Hur' ku leez,* (in Greek, Heracles), a famous hero, son of Jupiter by the mortal, Alcmena. Jealous Juno early determined to destroy Hercules, and when he was but eight months old she sent two serpents to his cradle. These he strangled. Shortly after his marriage, the queen of heaven afflicted him with madness, which led him to kill his three children. In atonement he agreed to serve for 12 years his cousin, Eurystheus, who enjoined upon him 12 desperate adventures. As an oracle had promised the hero that on completing his adventures he was to be transplanted to heaven, and as he had divine aid in a sword from Mercury, a bow from Apollo, a golden breastplate from Vulcan, steeds from Neptune and a garment from Minerva, he was able to carry out the commands of his cousin successfully. These were: (1) to kill the ravaging Nemean lion, the skin of which he ever after wore; (2) to slay the Hydra (See HYDRA); (3) to present to Eurystheus, alive and uninjured, a miraculously fleet stag with golden horns; (4) to take alive a certain wild boar, the sight of which was so appalling that, after beholding it, King Eurystheus locked himself in his brazen chamber for days; (5) to cleanse the Augean stables (See AUGEAS); (6) to kill the carnivorous birds ravaging about the Arcadian lake, Stymphalus; (7) to procure alive a monstrous wild bull devastating Crete; (8) to lead to his cousin the mares of Diomedes (See DIOMÈDES); (9) to capture for Admeta, daughter of his cousin, the girdle of the Amazon queen (See HIPPOLYTA); (10) to kill the three-bodied monster, Geryon, capturing his oxen; (11) to get the golden apples of Juno from the Hesperides (See HESPERIDES); and (12) last and most arduous of all, to bring to earth Cerberus, three-headed dog of Pluto.

After Hercules had conquered these trials, he had a recurring fit of madness, in which he killed his friend, Iphitus. To expiate this crime he became a three-year slave to Omphale, Queen of Lydia, serving effeminately as her handmaid, while she wore his lion skin and wielded his club. At the expiration of this service he married Dejanira, with whom he was most happy until the Centaur, Nessus, carrying her across a stream, one day, attempted to run away with her. Hercules shot the Centaur, who, dying, cautioned Dejanira to keep some of his blood as a philter for preserving her husband's affection. When, sometime later, Dejanira became jealous

of the captive of Hercules, fair Iole, she dipped one of his garments in the blood of Nessus, as directed. Barely had the tunic become warm on his body when the hero was seized with most violent agonies. His wife hanged herself in grief, while Hercules, unable to endure the torture, since he could not pull the garment from him, wrapped his lion skin about him, and, lying on a funeral pile, with his trusty club beneath his head, ordered the torch to be applied.

Only the mortal in Hercules was consumed. When his spirit was transported to heaven, Juno, at last reconciled, gave him her daughter Hebe for a wife.

Hercules Beetle, or **Rhinoceros Beetle,** a large beetle of the Scarabæus Family. It is especially noted for being the largest and most oddly shaped of beetles. Its color is olive green, marked with darker spots; the male bears a large horn upon its head, and three of smaller size, but of unequal length, upon the first segment of the thorax. In place of horns the female has small protuberances only. The Hercules beetle is found in the South and West, and attains its greatest development in the West Indies, where it is commonly six inches in length.

Hercules, Pillars of, a name given to the two rocks which guard the entrance to the Mediterranean Sea at the Strait of Gibraltar. The old legend runs that they were once united, but that Hercules wrested them apart in order to admit the waters of the ocean into the Mediterranean Sea; another version shows them temporarily joined by him to serve the purpose of a bridge. See GIBRALTAR, STRAIT OF.

Herder, Johann Gottfried von (1744-1803), a German poet and critic, born in Mohrungen, East Prussia. As a student, and later an instructor, at Königsberg, he read widely along the lines of science, philosophy, philology and politics, and came under the influence of Kant. He became assistant master in the Cathedral School at Riga, and afterwards assistant pastor at the same place. In 1776 he became court preacher at Weimar, and enjoyed the companionship of Goethe, Jean Paul and Wieland. Herder was a Romanticist, waging war on the imitations of French literature and urging the German poets to express their personal and national individuality. His own poetry was skillful, nothing more. He laid the foundation for the science of comparative philology by his investigations into the origin and development of language. In the *Philosophy of the History of Man,* his masterpiece, he traces the evolution of human society and establishes the science of primitive culture. Other works are *Recent German Literature, Spirit of Hebrew Poetry* and the collection *Poems, Songs and the Cid.*

Hered'ity, the transmission of physical and mental characteristics from parents to children. It is supposed to have physical basis in the direct transmission to the offspring of minute particles, called chromatins, and is made evident in four ways: continuous inheritance where the children have characteristics of both parents; interrupted inheritance, where the children resemble grandparents; collateral inheritance, where they resemble indirect antecedents, as aunts, uncles, etc.; and atavism, where they revert in type to a remote ancestor. The laws of heredity are not rigid and are influenced by environments, else all members of one race would have the same characteristics. See MENDEL'S LAW.

Her'kimer, Nicholas (1715-1777), an American soldier of the Revolution, born in Herkimer County, N. Y. He was lieutenant of militia during the French and Indian War and commanded Ft. Herkimer during the French attack on German Flats, 1758. At the opening of the Revolution he became colonel of militia, was promoted in 1776 to the rank of brigadier-general and commanded the forces opposed to the Tories and their Indian allies in western New York. Early in the Battle of Oriskany Herkimer's horse was shot beneath him and his leg was shattered by a ball. Nothing daunted, he lighted his pipe and directed the battle from a seat under a tree. He died ten days later as the result of an unskillful operation. A monument was

erected to his memory at Oriskany in 1884, and on Aug. 6, 1907, one was unveiled at Herkimer. See ORISKANY, BATTLE OF.

Her'komer, Sir Hubert von (1849-1914), an English painter, etcher, enamel worker and mezzotint engraver, born in Bavaria. His family removed to England in 1857. After serious study at South Kensington, he exhibited at the Royal Academy. In 1881 he founded the Herkomer School, which afterwards became famous, and four years later was appointed Slade professor at Oxford. He has exercised a marked influence upon art study in England.

Hermione, *Her mī' o ne,* in Greek myths, daughter of Menelaus and Helen. Ignorant of a private engagement to her cousin, Orestes, her father married her to Neoptolemus (Pyrrhus). On his death, however, she married Orestes, to whom she brought Sparta as her dowry.

Hermit Crab. See CRAB.

Hermit Thrush. See THRUSH, subhead *Hermit Thrush.*

Her'mon, a mountain of Palestine, noted for its connection with events mentioned in the Bible. It belongs to the Anti-Libanus Range and has an altitude of 9400 ft. Its slopes are covered with vegetation, but the summit is usually capped with snow. Hermon is surrounded by the ruins of ancient temples, and it is supposed to be the scene of the Transfiguration.

Her'nia, or **Rupture,** a disease caused by the protruding of any organ or part of an organ of the body through an abnormal or accidental opening beyond its natural cavity. Such displacement usually causes the formation of tumors. Although the lungs, heart and other organs may be displaced by rupture, such a lesion usually occurs in the abdominal cavity, and is commonly caused by violent straining. Men are more frequently affected than women, the percentage being four to one. Permanent cure is obtained only through a surgical operation.

He'ro, a beautiful priestess of Venus, at Sestos, in Thrace. She was beloved by Leander, of Abydos, who nightly swam the Hellespont to visit her. Hero, meanwhile, directed his course by placing a flaming torch on her high tower. When Leander was drowned, one stormy night, Hero cast herself into the sea.

Her'od, the family name of a group of rulers of Palestine. The name is derived from that of Herod the Great, its most famous member.

HEROD THE GREAT, son of Antipater, governor of Idumea, reigned as King of Judea from 37 B. C. to 4 B. C. Until 25 B. C. he was obliged to contend against the hostility of the Sadducees and Pharisees and the surviving members of a rival house, but for 12 years thereafter his rule was prosperous. He did not scruple to gain his ends by means of murder, confiscation of property and political intrigue. During this period he rebuilt and beautified many cities, not only in Palestine, but in Syria, Asia Minor and Greece. He rebuilt the Temple at Jerusalem with lavish expenditure. Shortly before his death Jesus was born in Bethlehem.

HEROD ANTIPAS, son of Herod the Great, ruled as tetrarch of Galilee from 4 B. C. to 37 A. D. Antipas is frequently mentioned in the New Testament, being especially remembered for his imprisonment and execution of John the Baptist. It was this ruler, also, to whom Pilate sent Jesus (*Luke xxiii, 7-15*).

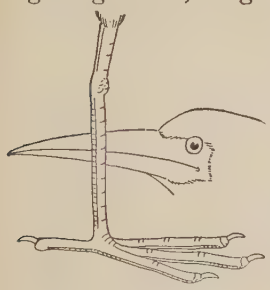
HEROD AGRIPPA (Agrippa I), grandson of Herod the Great, ruled in Palestine from 37 A. D. to 44. Shortly after the accession of Caligula, as Emperor of Rome (37 A. D.), that monarch gave Agrippa the tetrarchies of Philip and Lysanias, with the title of King, while the Senate gave him the honorary rank of prætor. In the year 40 he obtained the fortified tetrarchy of Antipas. A year later, on the accession of Claudius, he was given the additional territory of Judea and Samaria. He showed much favor toward his Jewish subjects, which probably accounts for his persecution of the Christians. His death is related in *Acts xii, 20-23.*

HEROD AGRIPPA (Agrippa II), son of

Agrippa I, ruled from 50 A. D. to about 100. On account of his extreme youth, Palestine was directly under Roman rule for six years after his father's death. In the year 50 he received the kingdom, but surrendered it in 53, receiving in return the former tetrarchy of Philip, the tetrarchy of Lysanias and the domains of Varus. Nero in 56 A. D. added to this the cities of Tiberias and Julias in Galilee, and Tarichea in Perea, including surrounding lands and villages. His rule was a weak one. This was the Agrippa before whom Paul was brought by Festus in Cæsarea, as related in *Acts xxv, 13-xxvi, 32.*

Herod'otus (about 484-about 425 B. C.), historian of ancient Greece, born at Halicarnassus, and often called the father of Greek history. He traveled through the East, visited Athens in the boyhood of Thucydides and came in contact with the noted men there. He then went to Thurii, Italy, where he spent the rest of his days, according to Pliny, writing his immortal history. His work is divided into nine books, each named after a Muse. The style is graceful, simple and flowing.

Heron, a family of wading birds having long necks, long legs and toes, and long bills. They live about ponds and swamps where they feed upon Crustaceans. Many species live in North America, where they are known by a variety of names. Their length is from 22 to 50 inches; the green heron, a heron with greenish back and chestnut neck, is the smallest and the great blue heron is the largest.



FOOT AND HEAD OF A HERON

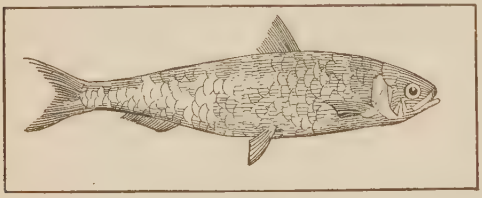
Great Blue Heron. This is the best known as well as the largest of the family. It is 50 inches long, has bluish upper parts, black and white streaked under parts and shoulders and brownish thighs. The edges of the wings are brownish and the top of the head is white. These birds nest in colonies, placing their huge, platformlike nests, made of sticks, rather high up in the trees. Three to six greenish-blue eggs are laid. Great blue herons are also called blue cranes and are a common sight in North America, where solitary birds are often seen sitting in an exposed situation. The flight of this heron is heavy; its huge wings flap slowly, its neck is doubled upon its breast and its long legs stick straight out behind. See Egret; Bittern; Night Heron.

Her'rick, Robert (1591-1674), an English poet, born in London. He was apprenticed to his uncle, William Herrick, a wealthy goldsmith, studied law and theology at Cambridge, and after taking orders became vicar of Dean Prior in Devonshire. The village ceremonies and superstitions fascinated him, and in his verse he recorded sympathetically the quaint customs of Christmas mummers and Twelfth Night revelers. On his return to London in 1648, he published his poems under the title *Hesperides.* Fourteen years later he returned to his charge at Dean Prior. He wrote over 1300 poems, all short, hundreds of them mere couplets. His verse in general reveals a careless joy of living; his love poems are tender and sweet. He emphasized perfection of form even at the sacrifice of subject matter. The first stanza of one of his songs, beginning "Gather ye rosebuds while ye may," is often quoted. Among his religious poems, *The Litany* is his masterpiece.

Herrick, Robert (1868-), an American novelist, born in Cambridge, Mass. He graduated at Harvard in 1890, and was appointed professor of English in the University of Chicago in 1905. His writings are characterized by an earnest and fearless sincerity of purpose, and deal with some of the most vital problems of American industrial and moral life. Together with Harrison Rhodes he produced the drama, *The Maternal Instinct,* which was staged in Chicago by the Chicago Drama League in 1912. His

other works include, *The Common Lot; The Web of Life; The Man Who Wins; Their Child; Together; The Master of the Inn; A Life for a Life; The Healer; Memoirs of an American Citizen; One Woman's Life; His Greatest Adventure; Clark's Field;* and *World Opinion.*

Herring, a family of important food fishes. Ten species are of commercial importance. All have graceful, tapering bodies, and forked tail. The scales are large, rounding and glistening, without any noticeable median line. It is estimated that over 3,000,000,000 herring are taken from the Atlantic annually. They are taken chiefly by weirs and gill nets, though the old method of "torching," or fishing by torchlight, is still occasionally practiced. They are shipped smoked, salted or pickled, and the young of one species are packed in oil and



HERRING

called sardines. A favorite canned preparation in England is called kippered herring.

The lake herring, an inhabitant of the Great Lakes region, is a member of the Salmon Family. It is found in large quantities in lakes Erie and Michigan, and is a popular food fish. It has a long, slender body which is of dull blue or green color above and light below. The fins differ greatly in color. Lake herring come toward shore in the spring, the spawning season, and are then caught in large quantities. Their ordinary weight rarely exceeds one pound and the maximum weight is two and one-half pounds. Cleveland is one of the chief ports of the lake herring fisheries. See SARDINE.

Herschel, *Hur' shel,* **Caroline Lucretia** (1750-1848), a German-English astronomer, sister of Sir William Herschel, born in Hanover, Germany. In early life she was not allowed the advantages of an education, her mother claiming her attention and time for household duties. In 1772 her brother took her with him to England. There she assisted him in his work as a musician, being the principal singer in his oratorios. Her real work was in connection with that of her brother in his astronomical researches. She took his observations, made his calculations and even fed him when his hands were occupied with the poor telescope that he was compelled to use in his earliest observations. She was, however, an astronomer in her own right, discovering several nebulæ and seven comets, of which five were first discovered by her. In 1822 she returned to Hanover and spent the remaining years of her life in astronomical work. In 1828 the Astronomical Society awarded her its gold medal, and in 1835 elected her an honorary member of the society. In 1846 the King of Prussia gave her a gold medal. See HERSCHEL, SIR WILLIAM.

Herschel, Sir John Frederick William (1792-1871), a distinguished mathematician, chemist and astronomer. He was born in Slough, England, the only son of Sir William Herschel. He began his education at Eton, but continued it under a private tutor and later at St. John's College, Cambridge. While here he began a work on differential calculus which was revolutionary in the mathematical world. In 1826 the Astronomical Society awarded him its gold medal in recognition of his work in the reexamination of his father's binary stars, and for his original investigations. He was knighted in 1831, and in 1833 he was awarded a medal of the Royal Society in recognition of his paper *On the Investigation of the Orbits of Revolving Double Stars.* His father's work and his own up to 1833 had been confined largely to northern skies. He moved to Table Bay, Cape of Good Hope, in that year, in order to study the southern heavens. His *Cape Observations* record the wonderful results of his work. Herschel was an accomplished

chemist and did much to lay the foundations of modern photography. He died at Hawkhurst, England, and is buried in Westminster Abbey. See HERSCHEL, SIR WILLIAM; TELESCOPE.

Herschel, Sir William (1738-1822), an English musician and astronomer, born in Hanover, Germany. His early education was limited. His father was a player of the hautboy in the Hanovarian Guards, and William joined the same band in his 17th year. He went to England in 1757 to try his fortunes. In 1772 he visited Hanover, and upon his return to England brought his sister Caroline with him. For several years he had been giving as much time as possible to the study of astronomy, and, by the aid of his sister, in 1774, he completed a Newtonian telescope having a focal length of six feet. In 1780 he gave some of the records of his observations to the Royal Society. In 1781 he discovered Uranus and its satellites. In recognition of his work he received the Copley medal from the Royal Society the same year. About this time he applied the principles of gravitation to the movements of the stars, his theory being fully justified a few years later, after patient observation for an extended period of binary stars and their orbits. In 1782 he became private astronomer to George III and removed to Slough. At this place in 1789 he completed his great telescope, 40 feet long and having a four-foot aperture, with which he discovered the sixth and seventh satellites of Saturn. In 1816 he was made a Hanovarian knight. See HERSCHEL, CAROLINE LUCRETIA.

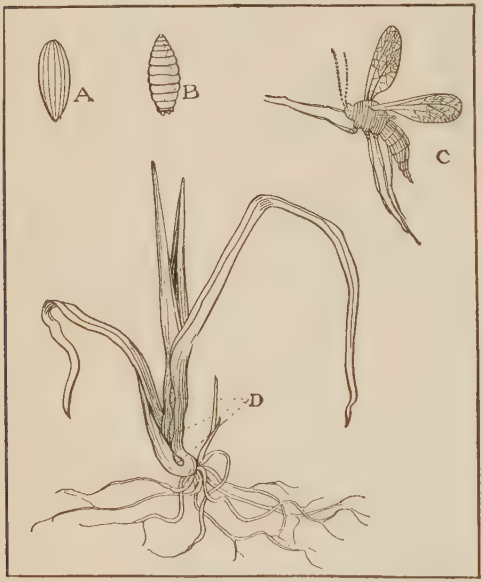
He'siod, one of the oldest poets of Greece. He lived a century or so after Homer, probably in the eighth century B. C., and about all that is known of his life is that he was a wandering singer. His principal works are the *Theogony,* a collection of fables on the creation of the world and the birth of the gods, interesting as being the oldest systematic compilation on Greek myths, and the *Works and Days.* In this poem the poet treats of agriculture and the choice of days suitable for the performance of certain acts. He also lays down precepts on such subjects as education and domestic economy. One other remaining work of the many ascribed to Hesiod is the fragmentary poem, the *Shield of Hercules.*

Hesperides, *Hes per' i deez,* (Western Maidens), in Greek myths three daughters of Atlas, commissioned by Juno to guard the golden apples which she had received as a wedding gift from the goddess of the Earth. They were aided by a hundred-headed serpent and were supposed to keep their watch in a garden in farthest Libya. The 11th labor of Hercules was to bring to Eurystheus some of these apples. See HERCULES.

Hesse, *Hes,* one of the states of the German Republic, the eighth in size. The northern division, known as the Province of Upper Hesse, is in the Province of Hesse-Nassau; the southern lies between Prussia, Baden, Bavaria and the Bavarian Palatinate. The surface is generally hilly and mountainous, and the industry of the inhabitants is about equally represented by agriculture and mining. The mineral products are coal, iron and salt, and the agricultural products consist of rye, wheat, oats, barley, hay and potatoes. Fruit growing and the cultivation of the vine are actively promoted. The principal towns are Darmstadt (the capital), Worms, Mainz, Bingen and Giessen. In 1806 Hesse became a grand duchy, and following the Congress of Vienna it became a member of the German Confederation. Its present limits were placed on it in 1866, during the war between Austria and Prussia, when it was forced to cede to Prussia some of its northern territory. Population, about 1,210,000.

Hessian, *Hesh'an,* Fly, a family of Insecta of the order Diptera. The members of this family have been known in the United States since 1778, when they were supposed to have been brought here in the straw of the Hessian troopers. In the adult stage, C, these insects are only about one-eighth of an

inch in length, and are black, with lighter-colored abdomens. They lay their eggs in the furrows on the upper surfaces of wheat leaves, where the larvæ, B, when hatched, can creep to the sheathing bases of the leaves, enter the tender stalk, D, and feed upon the sap. In a few weeks the larva changes to the pupa, or "flaxseed," stage, A. It is then a tiny brown object resembling the seed of the flax. In a few more days the adult appears, and its life is of such short duration as to enable it only to lay its eggs before it dies. These eggs also develop rapidly and there are often



HESSIAN FLY

from two to five broods annually. Those insects which survive the winter are the ones which are in the flaxseed stage when the cold weather sets in. Wheat, rye and barley attacked by the Hessian fly are weakened and produce little seed. It is estimated that these insects cause annually in the United States alone a loss of $10,000,000 in grains. They are found everywhere in wheat regions. Stubble of infected grain should be burned or plowed under, and winter wheat should be sown as late as possible in order to offer no place for the reception of the eggs. See DIPTERA; INSECTICIDE.

Hessians, mercenary troops hired by Great Britain from the Landgrave of Hesse-Cassel and other German princes to subjugate the American colonies. Eager for the hire, six of these petty princes between them furnished England with about 30,000 soldiers. These Germans had not voluntarily offered their services. They had been let to England without their consent. According to agreement, George III was to pay a certain stipulated sum for each dead Hessian. Three wounded men were equal to one who had been killed. The hiring of these auxiliaries caused the greatest indignation in America. Some 2200 Hessians lost their lives in the war, about 5000 surrendered at Saratoga, Trenton and Bennington, while many deserted the British, upon offers of land from Congress, and became American citizens.

Hew'lett, Maurice Henry (1861-), an English novelist, born in London. His work reveals an intimate knowledge of medieval life in England and Italy, and is a successful combination of fiction and history. He has written *New Canterbury Tales, Pan and the Young Shepherd, Little Novels of Italy, The Forest Lovers, The Fool Errant, The Half-way House, Idylls and Songs* and *The Agonists.*

Hez"eki'ah, King of Judah, son and successor of Ahaz. He reigned from about 720 to 691 B. C. On his accession he immediately entered upon the work of reforming the nation, which had become idolatrous and corrupt. The second book of *Kings* chronicles the invasion of Sennacherib, King of Assyria, during Hezekiah's reign, and the destruction of the invader's army by a pestilence.

Hiawatha, *Hi" a wah' thah,* generally supposed to be a legendary personage of the American Indians and the hero of Longfellow's poem *Hiawatha,* was in reality a chief of the Iroquois confederacy of the Five Nations. He was a wise lawgiver and is considered by the Iroquois the greatest chief that ever lived.

Longfellow's poem, however, is based upon the legendary character who was known among different tribes by different names, as Chiado and Manabozho, and among the Ojibways as Hiawatha.

Hib'ben, John Grier (1861-), an American scholar, author and university president, born at Peoria, Ill., and educated at Princeton. After graduation from the Princeton Theological Seminary, he spent a year in study at the University of Berlin; and then served as pastor of a church at Chambersburg, Pa., from 1887 to 1891, when he was appointed an instructor in logic and psychology in his alma mater. As professor of logic since 1896, he has won recognition at home and abroad by various scholarly publications, while gaining the esteem of his associates and the devoted and enthusiastic affection of the student body. In January, 1912, he was elected president of the university, to succeed Woodrow Wilson, who had become governor of New Jersey in 1910. Dr. Hibben is the author of *Inductive Logic, Hegel's Logic, Deductive Logic, The Problems of Philosophy, The Philosophy of the Enlightenment* and the editor of *Epochs of Philosophy* (12 vols.).

Hib'bing, Minn., a city of St. Louis Co., 80 m. n.w. of Duluth, on the Great Northern, the Duluth, Missabe & Northern and other railroads. It is situated in the Mesaba iron-ore region, and there are 40 or more mines in operation in the vicinity. Other important industries are lumbering and farming. Hibbing was settled in 1892 and incorporated in 1893. Population in 1920, 15,089.

Hi"berna'tion, a state of stupor in which many animals pass the winter. The term has been broadened in its usage until it now also includes the same state when brought on by heat, cold, scarcity of food or other causes not originating in disease. If the same condition is brought on in summer, it is called *æstivation.* Naturally hibernation occurs only among animals which do not migrate, and seems to be a provision of nature which renders migration unnecessary. True hibernation is generally preceded by a period during which the animal acquires a great deal of fat, evidently to furnish its sustenance during its inactive months. The animal then seeks a burrow, hollow tree or other sheltered spot and enters a state very akin to death. The temperature of the body lowers until it becomes nearly that of the surrounding atmosphere, and in many cases breathing is almost stopped. Female bears, Rodents and almost all wood animals seek winter quarters probably because food is scarce; those, however, which have stored food in their burrows and there feed upon it during the winter cannot be said to hibernate.

Many species of Reptilia, as alligators, serpents and turtles, go into a stupor upon the approach of cold weather or when their marshy haunts dry out, and during early, cool spring mornings it is not at all unusual to find a serpent, stiffened to inactivity by the cold, later becoming active when the sun's rays warm the air. Hibernation does not, however, mean freezing, which may be said to be a pathological, or diseased, condition. Snails and many small aquatic animals are similarly affected by heat or drought.

Hibiscus, *Hi bis' kus,* a class of herbs or shrubs of the Mallow Family, having beautiful, large, purple, white or rose-colored flowers. The marsh hibiscus is a tall perennial with sharp-pointed, gray-green leaves, slightly woolly underneath. The flowers have five widespreading petals, generally veined with pink. These blossoms in form greatly resemble those of the weed mallow, but are much larger and more showy. A fleshy column stands at the center of the flower and bears upon its surface many stamens extending laterally, and, upon its summit, the pistil. Species of the hibiscus grow throughout eastern and central United States, and all, like other mallows, contain a thick, mucilaginous substance used in making mucilage, confectioners' paste, etc. Cultivated varieties are found in parks and greenhouses. See HOLLYHOCK; MALLOW.

Hiccough, *Hik' up,* or **Hiccup,** a convulsive movement of the diaphragm which interferes with the inspiration of the air. These movements occur at brief, regular intervals, and the attack usually lasts a few moments, though in some cases it may continue for hours and give rise to complete exhaustion, or result, as in rare cases, in death. The disturbance is caused by indigestion or by a fit of laughing, and may be cured by holding the breath or by taking sips of water in rapid succession. Hiccough is a serious symptom of appendicitis, peritonitis and pneumonia.

Hick'ory, a name given to a number of large and valuable trees of the Walnut Family, growing in the United States from the St. Lawrence to Mexico. There are 12 species, 11 of which are native in the Western world. The cylindrical trunk is usually rather large and has a smooth or shaggy, gray bark that varies in different species and serves as a means of distinguishing them. The wood of the hickory is tough, hard and brown and valuable for fuel, tool handles and agricultural implements. The branches are flexible and of use for withes. The leaves are made up of many narrow leaflets, which have finely-toothed margins; they are glandular-dotted and turn a bright yellow in the autumn; when they fall it is often only the blade that drops, leaving the leaf stem on the tree through the winter. If this stem does fall, it leaves a prominent leaf scar much lighter in color than the twig. The flowers are of two kinds, in drooping catkins and in erect spikes, the latter of which produce the common shuck-covered hickory nut.

The commonest hickories of the United States are: the water hickory, which is commercially unimportant; the butternut hickory, whose fruit is not edible; the shagbark and the shellbark, whose bark hangs in long, loose scales; the mockernut, whose bark is gray; and the pignut, whose fruit is sometimes bitter and sometimes sweet. See PECAN.

Hicks, Thomas Holliday (1798-1865), an American statesman, born in Dorchester County, Md. He was sheriff, member of the State Legislature, of the State Electoral College and of the governor's council, and, from 1858 to 1862, governor of the State of Maryland. By prompt and vigorous action, he succeeded in preventing the secession of his state, although he was the only prominent state official who took a decided stand for the Lincoln administration. The wisdom of his course became apparent, however, to the people of Maryland, and at the close of his administration the Legislature passed resolutions thanking him for his action. In 1862 he accepted a seat in the Senate, which he continued to occupy until his death.

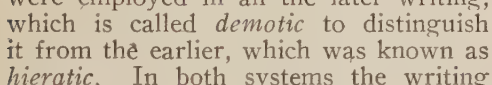
Hieroglyphics. *Hi" er o glif' iks,* the name commonly given picture writing, such as that used by the ancient Egyptians, the Aztecs and the North American Indians. The name is derived from two Greek words and means sacred engraving. The oldest inscriptions were sculptured on the buildings and monuments of Egypt, and were at first supposed to relate to sacred subjects which only the priests understood. From this supposition the name originated. The hieroglyphics of the Aztecs and Indians are not as perfect as those of the ancient Egyptians, who brought their system of writing to a high degree of perfection. It is impossible to trace the Egyptian system to its origin, since it is well developed on the most ancient monuments and tombs that have been discovered. The system consists of symbols of natural objects and arbitrary signs so arranged in the writing as to make the desired record. Some of the symbols, such as that for man, woman, soldier and child, are easily recognized. Others, however, are more difficult to interpret. To illustrate, weeping is represented by the eye with flowing tears; going, by a pair of legs; returning, by the pair of legs going in the opposite direction; water, by horizontal wavy lines; and rain, by vertical wavy lines. Sometimes the same picture is used for two or three words and its meaning can

be determined only by the pictures and symbols preceding and following it. Thus many signs came to pass from mere signs of words to signs of syllables or sounds; that is, they passed from the ideographic class to the phonetic class. It is supposed that in this way the alphabet was developed, though there is no evidence that the alphabet invented by the Phœnicians, and from which our alphabet is derived, sustains any relation to the alphabet developed from Egyptian hieroglyphics. Some of the peculiarities of this alphabet are here shown.

EGYPTIAN HIEROGLYPHICS

The Egyptian sign alphabet soon changed to one of symbols, and these were employed in all the later writing, which is called *demotic* to distinguish it from the earlier, which was known as *hieratic*. In both systems the writing was, with rare exceptions, from right to left.

For centuries scholars were unable to translate Egyptian hieroglyphics, but in 1799 Captain Boussard discovered the Rosetta Stone, which gave a key to the writings and language (See ROSETTA STONE). This stone contained the same inscription in hieroglyphics, demotic and Greek. By working from the Greek to



EGYPTIAN HIEROGLYPHICS

the demotic and from that to the hieroglyphic, a key was discovered after much study, and Champollion and, in 1822, Dr. Thomas Young, independent of each other, discovered a method of reading the characters which could be applied to other inscriptions. Since then many records have been translated and dictionaries and grammars written. The picture writing of the American Indians, as shown by the following symbols, was crude and simple. The Indians used no phonetic symbols and each symbol represented a word.

Hig'ginson, Thomas Wentworth (1823-1911), an American writer and soldier, born in Cambridge, Mass. He was educated at Harvard, where he became the friend of Edward Everett Hale and Thoreau, studied under Longfellow, whose niece he married, and lived next door to Oliver Wendell Holmes. After Higginson's graduation he studied theology, then entered the ministry. In 1850 he was the candidate for Congress on the Free-Soil ticket. A zealous anti-slavery advocate, he took part in the Kansas struggles and also served in the Civil War, becoming colonel of the first regiment of freed slaves. After the war he devoted himself to literature, education, and the political rights of women. Among the more noteworthy of his many writings, are, *Outdoor Papers; Atlantic Essays; Oldport Days; Young Folks' History of United States; Common Sense about Woman; Life of Margaret Fuller Ossoli; Cheerful Yesterdays.* (Z. A. D.)

INDIAN HIEROGLYPHICS

High-Hole. See FLICKER.

High Point, N. C., a city of Guilford Co., 78 m. n.e. of Charlotte, on the Southern and other railroads. The chief sources of revenue are farming and manufacturing. The city contains several woodworking mills and furniture factories. Safes, brick, buggies and shuttles are also made. High Point was settled in 1840 and incorporated in 1858; it is administered under a revised charter of 1901. Population in 1920, 14,302.

High Priest, the chief of the Jewish priests, the representative of the entire priesthood and of the whole nation. The age of 20 is commonly assumed by Jewish tradition to be the earliest for entrance into this office. The special function of the high priest related to the great Day of Atonement, on which he entered the Holy of Holies to sprinkle the blood of the sin offering on the mercy

seat and to burn incense. He also had charge of the whole public worship and of the treasures of the Temple, and in later times was the president of the Sanhedrin. His garments were costly and beautiful, but were laid aside when he entered the Holy of Holies, on which occasion he wore only a white robe. The history of the high priests covers a period of 1370 years, beginning with Aaron. The office originally descended from father to son and was for life, but in the time of Christ civil rulers removed and appointed high priests as they chose.

High School, in the United States a secondary school, public or private, which provides instruction beyond the curriculum of the elementary grades, but of less advanced character than that which the college affords (See ACADEMY). The boys' English High School of Boston, established in 1821, was the first of such institutions in America; but other cities soon began to make similar provisions for both sexes. Horace Mann, Henry Barnard and other prominent educators rendered an inestimable service by emphasizing in their day the importance of providing secondary schools, and both the justice and necessity for arranging to support these with public funds, thereby making them directly responsive to the will of the people.

Free high schools now form a part of the public school system of every state in the Union, though in most states they are open only to the pupils of the district in which they are located. From necessity these schools are located in cities and towns, leaving the youth of rural communities without high-school privileges. In several states this condition has been remedied by establishing township high schools, as in Illinois, and by the consolidation of school districts, as in Ohio. In some states, as Minnesota and Wisconsin, the high schools are affiliated with the state university. High schools usually have buildings constructed on the most approved plans and are equipped with laboratories for the study of physical science and with libraries of reference works and maps. Many of them are also equipped for teaching domestic science. See COMMON SCHOOLS.

High Seas, the ocean or open sea. The general principle of international law now accepted is that the jurisdiction of maritime nations extends only for three miles, or within cannon range of their own coasts, the remainder of the seas being high seas, accessible on equal terms to all nations. Inland seas and estuaries are excepted.

Highway. See ROAD.

Hil'dreth, Richard (1807-1865), an American historian, born in Deerfield, Mass., and educated at Harvard. Later he studied and practiced law until 1832, when he began to edit the Boston *Atlas,* an influential political paper. In 1834 he removed to a plantation in Florida, where, as a result of observations, he published an anti-slavery novel, bearing, on its publication, the title *The White Slave.* His principal work is a *History of the United States.* In six volumes, it deals accurately with events up to Monroe's administration. In 1861 Lincoln appointed him consul at Trieste.

Hill, Ambrose Powell (1825-1865), an American soldier, born in Culpeper County, Va., and educated at West Point. He served in the Mexican and Seminole wars, and at the outbreak of the Civil War entered the Confederate service as colonel of the 13th Virginia Volunteers. A most efficient officer, he fought at the first Battle of Bull Run, at Antietam, Fredericksburg, Chancellorsville and Gettysburg, becoming major-general, and distinguished himself in the defense of Petersburg and Richmond. He was killed during the final struggle at Petersburg.

Hill, Benjamin Harvey (1823-1882), an American legislator, born in Georgia. He graduated from the Georgia State University in 1844, studied law and was admitted to the bar. He was a member of the State Legislature in 1851, and ten years later was a member of the State Secession Congress. He was a Unionist, and endeavored to prevent the secession of his state. Later he sat in the Confederate Senate. Hill was opposed to

the acts of Congress regarding reconstruction and wrote *Notes on the Situation,* which was widely read. In 1875 he was sent as a representative to Congress, and from 1876 until his death he occupied a seat in the United States Senate.

Hill, Daniel Harvey (1821-1889), an American soldier, born in South Carolina. He graduated at West Point in 1842, served in the Mexican War and was brevetted major for gallant conduct. In 1849 he became professor of mathematics in Washington College, and six years later accepted a similar position in Davidson College, North Carolina. He entered the Confederate army in 1861, was in active service throughout the war and rose steadily in rank until he became lieutenant-general.

Hill, David Jayne (1850-), an American scholar and diplomat, born at Plainfield, N. J., and a graduate of Bucknell University. He served Bucknell as professor of rhetoric for three years and as president for eleven years. From 1888 to 1896 he was president of the University of Rochester, resigning to spend three years in Europe in the study of international law and diplomacy. After five years in Washington as first assistant secretary of state, he became the representative of the United States to Switzerland and later to Netherlands. From 1908 to 1911 he was ambassador to Germany. He edited *Jevons' Logic* and is European editor of *The American Journal of International Law.* His writings include *The Science of Rhetoric* and *The Elements of Rhetoric and Composition,* various biographies, *International Justice* and *A Primer of Finance.*

Hill, James Jerome (1838-1916), an American financier and railway manager, born in Guelph, Ontario. At the age of 19 he left his father's farm and went to St. Paul, Minn. In 1865 he became agent for the Northwestern Packet Company, and later engaged in a fuel and transportation business for himself. In 1870 he established the Red River Transportation Company, which was the first to open communication between St. Paul and Winnipeg. Later, Mr. Hill organized a company which secured control of the St. Paul & Pacific Railroad, and reorganized it as the St. Paul, Minneapolis & Manitoba Railway, of which he became general manager, and later president. Under his management this road was extended from a few local lines until it became the Great Northern System, joining Lake Superior to Puget Sound and having a line of steamers connecting with China and Japan. Under Mr. Hill's direction the Northern Pacific and Burlington systems were made cooperative with the Great Northern System. In 1907 he retired from the presidency of the Great Northern lines.

As a man of foresight, courage, financial and executive ability, Mr. Hill has had few equals in his generation, and he has been the leader in the development of the new states through which his railways extend. He is a man of fine culture, and is a fluent public speaker and clear and vigorous writer.

Hill'is, Newell Dwight (1858-), Presbyterian clergyman and author, born at Magnolia, Iowa. He studied in Iowa College, graduated from Lake Forest University in 1884 and from McCormick Theological Seminary in 1887. He was pastor at Peoria, Ill., from 1886 to 1889; Evanston, Ill., 1889 to 1895; Central Church (Independent), Chicago, from 1895 to 1899. In 1899 he accepted a call to Plymouth Congregational Church, Brooklyn, N. Y. Dr. Hillis is noted as a preacher and lecturer, and as an interesting and profitable writer. Among his books may be mentioned *The Investment of Influence, Quest of Happiness, Foretokens of Immortality, How the Inner Light Failed, A Man's Value to Society, Great Books as Life Teachers* and *Success Through Self-Help.*

Himalaya, *Him ah' lah yah,* **Mountains,** the highest mountains of the globe, lying in an irregular curve separating the northern boundary of India from Tibet. They consist of many rugged peaks forming a great mass nearly 1500 m. in extent and varying in width from 100 to 150 m. They are inter-

sected by great canyons, rapid rivers formed by the melting snows, and vast plateaus or fertile valleys.

The general height of the mountains is 18,000 ft., but more than 40 rise above 24,000 ft. and Mt. Everest, believed to be the highest mountain of the world, is over 29,000 ft. On the southern slopes the snow line is at an elevation of 16,300 ft., while on the north it is extremely varied. Toward India vegetation is tropical to a comparatively great height, though above 7000 ft. there are few trees other than pine; flowers are found as high as 19,000 ft.; and grain is cultivated at 15,000 ft. The huge glaciers upon the summits of the Himalayas and the great avalanches that sweep down the slopes are unsurpassed in majesty and beauty. Many explorers have visited these mountains and brought home interesting and scientific reports of the region which they explored. Among the most interesting are those of Dr. and Mrs. Workman, who, in 1903, ascended the mountains 23,294 ft. in the interest of missionary work.

Hin'duism, the general term used to include the various social institutions and numerous religions and sects that have grown out of the Brahmanical writings, particularly Brahmanism, Jainism and Buddhism. See BRAHMANISM; JAINISM; BUDDHISM.

Hin'du Kush' Mountains, a range of mountains of central Asia forming for some distance the border between India and Afghanistan. It extends from the source of the Indus River westward to the Bamian Pass; nearly the whole of the range is contained in Afghanistan. At the north lies the great Pamir Plateau, known as the "roof of the world." The mean height of the mountains is 20,000 ft., but the Tirach Mir is probably over 25,000 ft. The mountains are crossed by many easily accessible passes, and many rivers have their source upon their slopes.

Hins'dale, Burke Aaron (1837-1900), an American educator and author, born in Ohio, and educated at Hiram College. He was ordained to the ministry in the Christian denomination in 1861. After preaching in Cleveland and elsewhere he became assistant editor of the *Christian Standard,* and three years later professor of history and English literature in Hiram College, serving as president of that institution from 1870 to 1882. He was superintendent of schools in Cleveland, Ohio, and in 1886 was made professor of the science and art of teaching in the University of Michigan. He was the author of several works, each considered standard authority. Among them are *Teaching the Language Arts, How to Study and Teach History* and *American Government, National and State.*

Hipparchus, *Hip par' kus,* the first systematic astronomer on record. According to Strabo, he was born at Nicæa, in Bithynia, early in the second century B. C. Nothing is known of his personal history. He is supposed to have written nine works, of which only the last and least important, *Commentary on Aratus,* has been preserved. The others treated of astronomy and geography.

Hip"pocam'pus. See SEA HORSE.

Hippocrates, *Hip pok' ra teez,* (about 460-357 B. C.), the most famous of Greek physicians, born on the Island of Cos. Having traveled throughout Greece, he became highly esteemed in his native island as a physician and author. He raised the medical school of Cos to a high standard, and Plato studied and quoted from his works. The works bearing the name of Hippocrates, and known as the Hippocratic Collection, contain some 60 volumes, only one-tenth of which were undeniably written by him. As a physician, Hippocrates divided the causes of disease into two classes: change of climate and environment and personal or individual causes. His treatment of disease was cautious, often consisting merely of attention to diet and regimen, and he was frequently accused of letting patients die because he took no means of keeping them alive.

Hippol'yta, a valorous Amazon queen, mistress of the belt of Mars which Eurystheus ordered Hercules to get for

his daughter, Admeta. When Hercules with his volunteer band, including Theseus, Castor and Pollux, was met at Themiscyra by Hippolyta, she promised to give up her girdle. But Juno, disguised as one of them, persuaded the other Amazons that the great hero had come to steal their Queen; whereupon, armed for battle, they charged down to the ships. Thinking that they were acting faithlessly, Hercules slew Hippolyta and sailed away with her girdle. Other accounts say that she married Theseus, becoming the mother of Hippolytus.

Hip"popot'amus, a huge, ungainly animal of the Swine Family, found in the thick, marshy jungles and near the great rivercourses of Africa. In size it probably ranks next to the elephant. It has a broad, flattened head with an immense protruding muzzle, and the mouth, which is like an enormous slit, can open to a spread of three feet. The eyes and ears are piglike and the body, though large, is also in shape somewhat like that of a pig. The flesh is tender and much relished by the Africans, who hunt it not only because it supplies food, but also because it is a nuisance, stopping up river channels, doing damage to navigation and destroying many acres of cultivated crops during a single night. In the daytime the hippopotamus likes to lie in the cool current of a shady stream or dive beneath its surface. In spite of its having enormous teeth the chief food of the hippopotamus is grass. The ivory of the hippopotamus obtained from the teeth is valued because it does not turn yellow, but its quality is not so good as that of the elephant.

Hirsch, *Hursh,* **Emil Gustav** (1852-), an American clergyman, born in Luxemburg, Germany. He came to the United States in 1866. After graduating from the University of Pennsylvania in 1872, he took postgraduate courses at Leipsic and Berlin, 1872-1876. The following year he returned to America and became rabbi of the Sinai Congregation at Baltimore. In 1878 he took charge of a similar congregation in Louisville, Ky., and in 1880 became rabbi of the Sinai Congregation, Chicago, and has been professor of rabbinical literature in the University of Chicago since 1892. He is the author of *Truths of Fiction from a Jewish Point of View,* and was editor of the *Zeitgeist* in Milwaukee from 1880 to 1887, and of the *Reformer,* New York, 1886. He has been editor of the *Reform Advocate,* since 1894; and also edited the Biblical department of the Jewish Encyclopædia from 1903 to 1906. He was presidential elector-at-large in 1896. He is an eminent authority on public charities and social settlement work.

Histol'ogy, the study of microscopic anatomy, generally of the animal body, although the term is broadened to include the corresponding study of vegetable tissue. The primary object is knowledge of the minute structure of the tissues in their normal condition. The study of histology has been possible only since the invention of the microscope, and has brought with it a much better understanding of both animal and vegetable life. This branch of science is responsible for the knowledge of the cellular structure of tissues and is of great assistance in the study of bacterial disease. See MICROSCOPE; BACTERIA.

History, in its broadest sense, a record of human progress. History began with the advent of man upon the earth, but it was a long time before man reached that stage of civilization in which he began to record his achievements. It was at this time that history is generally considered to have begun. The ages previous to this are known as prehistoric time. Since the time when man first appeared has not been determined, we do not know the duration of prehistoric time, but that it is much longer than historic time all students affirm. History of savage tribes, such as the natives in the interior of Africa, or the American Indians as they were first known to white men, is not considered. It is only as the various tribes developed into nations having organized government and constructing works which marked their progress, such as permanent dwellings and imple-

ments of warfare and of agriculture and the mechanic arts, that they have appeared in the field of history. From this we can see that the dividing line between historic and prehistoric time cannot always be sharply drawn.

Sources. The chief sources of history are written documents, architectural remains, medals, coins, implements and whatever is authentic evidence of the life and customs of a people at the time. Another important source consists of traditions, which before the art of writing was known, were handed down by narration from one generation to another. Most of these traditions now form a part of the literature of the people among whom they originated. Since literature connects the present with the past, there is an unbroken connection between the earliest recorded history and that of the present time.

Limitations. Since civilization is constantly advancing, history can never be an exact or a complete science. True history not only narrates events, but also attempts to show the relation of these events to those that follow, and the statement of these relations is limited to the historian's ability to grasp and solve the problem before him. Again, history, as written and studied by the nations of Europe and America, is the history only of those nations which have influenced the civilization upon these continents. Beginning with the nations of antiquity, which clustered around the Mediterranean, Egypt, Babylonia, Assyria and Persia, and connecting their history with that of Greece and Rome, it omits entirely the history of the nations of the Orient, India, China and Japan.

Divisions. Historians generally agree in dividing history into three periods, ancient, medieval and modern, but there is no distinct dividing line between these periods. Ancient history gradually merges into medieval, and medieval into modern. According to most historians, ancient history embraces the period from the beginning of historic time to the fall of the Western Empire, 476 A. D., but some authorities extend the period to the death of Charlemagne, 814 A. D. Medieval history extends from ancient history to the discovery of America in 1492, and modern history from that date to the present time.

Value. Civilization is the evolution of society. It includes all lines of activity, and the great political and military movements which may characterize a given period, and upon which too frequently undue emphasis is placed, mark the turning points of a larger movement by which progress along social, educational, economic and religious lines is measured. A knowledge of history is, therefore, essential to all who would understand the institutions of society in their own and in other countries. The study of history reveals the centuries of struggle through which the race has passed to attain its present stage of freedom. It also shows us that the rapidity of this progress has increased with the centuries and that this progress has been towards a kindlier spirit and a broader humanity. The great transformations of the 19th century have been brought about through a broader democracy in politics and industry, and through inventions which, by bringing the nations into closer touch with each other and by freeing man from drudgery, have given him opportunity for broader intellectual culture.

The Compendium. It is often difficult for the general reader and the inexperienced student to follow the complex thread of events through medieval and modern history. The Compendium of the History of the World on the following pages enables one to get, at a glance, a comprehensive idea of any period and also to study chronologically the history of any nation.

The following works will be found helpful to those desiring a more extended knowledge of the science of history: Emerson, *Essay on History;* Harrison, *The Meaning of History;* Lamprecht, *What is History;* Adams, *Manual of Historical Literature.* Also consult the publications of the American Historical Association.

COMPENDIUM

OF THE

HISTORY OF THE WORLD

FROM

ANCIENT TO MODERN TIMES

BY

CONRAD E. PATZER

HEAD OF THE DEPARTMENT OF SUPERVISION, STATE NORMAL SCHOOL

MILWAUKEE, WIS.

Concise but comprehensive.

Gives at a glance the chronological history of any nation and the contemporaneous history of all nations.

Prevents confusion in chronology of events.

Shows in the order of their succession the great steps in civilization from the dawn of history to the present day.

EXPLANATION. The history of the nations is arranged in parallel columns, the same dates coming opposite each other in these columns. To trace the history of any nation, read the events set forth in the column with the name of that nation as its heading. To trace the history of Rome, read the column *Rome* from the beginning until this nation disappears. To trace contemporaneous history, read across the columns of both pages if the history of all nations is required. If not, read as far as necessary to meet the requirements. To obtain the contemporaneous history of Greece and Rome, read across the first page only. To obtain a like history of these nations, the East and Egypt, read across both pages.

The blank spaces indicate the absence of any important event during the period they cover. Rome had no history previous to 753 B. C.

The relative width of the columns gives an idea of the relative importance of the nations. When Rome has become mistress of the world, the entire page is devoted to her history. At the beginning only a small part of the page is devoted to it.

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THE EAST

3800 B. C.—Sargon the Elder
There were many great cities in Chaldea, the most ancient of which was Ur.

2400 B. C.—Babylon a Growing Power
Babylon had brought Chaldea under her sway.

2000 B. C.—Chaldean Rule Extends Over Syria
Babylon extended her power over Syria. About this time Abraham emigrated from Chaldea.

1600 B. C.—The Phœnicians
The Phœnicians occupied a little strip of country along the Mediterranean. They were a commercial people and founded many cities, the most important being Carthage. They invented the alphabet. They taught the Greeks the civilization of the East, which the Greeks in turn were to teach Europe.

1000 B. C.—Solomon, King of Judea
Solomon with Jerusalem as a center built up a Jewish empire. The history of the Jews is a record of the spiritual growth of a nation. Christianity developed out of the Jewish religion.

1000 B. C.—Tiglath-Pileser I
This Assyrian king extended his empire to the Mediterranean.

Chaldean Civilization
Babylonian and Assyrian civilizations compared favorably with that of Egypt, and in some respects excelled it. In the industrial and the applied arts these people made use of their knowledge of the sciences. The principle of the lever and the pulley was known to them. Their looms produced the finest silk and woolen cloths. Though the Babylonians were limited to sun-dried brick they constructed wonderful edifices. In Assyria, where access was had to stone, the palaces were marvels of architectural beauty. They studied geometry and astronomy, and their general literature, including books in history, geography, novels and stories, was so abundant that in the ruins of the cities have been found whole libraries of clay tablets covered with "cuneiform" writing. They had codes of laws as early as 2300 B. C.

745 B. C.—Tiglath-Pileser III
This king established the most powerful empire the world had yet seen. He appointed Assyrian satraps, or governors, to rule the subject kingdoms.

EGYPT

5000 B. C.—Memphis
At this date, Egypt appears as an already highly developed power. Menes of Theni founded the First or Old Egyptian Empire with its capital city at Memphis.

3800 B. C.—The Pyramids
The Great Pyramids at Gizeh were built by the pharaohs of the 4th dynasty between 3800 and 3500 B. C.

2800 B. C.—Thebes
The formation of the Second or Middle Egyptian Empire with Thebes as the royal city.

1600 B. C.—Expulsion of the Hyksos
By 1600 B. C. the Hyksos kings were driven out of Egypt. Egypt now entered upon the most brilliant period of its history.

1350 B. C.—Rameses II
The reign of Rameses II closed this brilliant period of nearly 300 years.

1320 B. C.—The Hebrew Exodus
The Hebrews, a desert people, had settled in Egypt during the Hyksos period. But, though in bondage, they grew into a nation, and in 1320 B. C. they escaped from Egypt and founded the Hebrew Kingdom in Palestine.

Egyptian Civilization
The Egypt of history is comprised by the narrow valley and delta of the Nile. The fertility of this region depends on the Nile. Rain rarely falls in Egypt, but during August and September of each year the river rises and its muddy waters cover all the valley except the raised roads and the towns and cities. Thus each year the receding waters give to the land a layer of rich vegetable mold. Egypt has rightfully been called "the gift of the Nile," but irrigation, introduced in prehistoric times, has helped to make it a productive region.

About 5,000,000 people occupied this narrow valley of less than 6000 sq. m. The Pyramids, built about 3500 B. C., prove that the Egyptians even at that early time must have reached a high state of civilization. These structures are among the great wonders of the world.

The Egyptians at an early time developed a wonderful literature. There were books on religion, history, geography, travel and various scientific subjects. The books were written in hieroglyphics, a kind of picture writing.

Ancestor worship constituted one form of religion, but joined to this was the revolting worship of animals. The worship of the personified powers was the highest form of religion.

About 1600 B. C., when Egypt began her great conquests, the Egyptian civilization first came into contact with the Chaldean. This opened a new era, and for many centuries trade flourished between the cities on the Euphrates and Tigris rivers and those on the Nile.

ROME

753 B. C.—Rome Founded

Legendary history declares that in 753 B. C. Rome was built by Romulus, the son of Mars, god of war, and Rhea Silvia, a Latin princess. Seven successive kings ruled Rome during the next 250 years, but little is known of the history of this period.

GREECE

2500 B. C.—The "First" Civilization

Excavations made in recent years seem to prove that this ancient civilization was not borrowed but native. These early Greeks worked in bronze, and had developed a high civilization.

1300 B. C.—The "Second" Civilization

The older civilization was partly overthrown by barbarians from the North. These people were mostly small farmers, though they lived in villages. The government was made up of a king, a council of chiefs and an assembly of freemen. The city was the political unit.

1000 B. C.—The Iliad and Odyssey

The Greeks believed that these poems were composed about 1000 B. C. by a blind minstrel named Homer. The *Iliad* describes the siege of Troy by the Greeks, and the *Odyssey* the wanderings of Ulysses, a Greek hero, who took part in the war.

1000 B. C.—Dorian Migration

About 1000 B. C. the Dorians, a barbarous people from the North, invaded Greece. Many Greeks, fleeing before the Dorians, crossed the sea and established themselves on the coast of Asia. They were known as Ionian Greeks, and they founded Miletus, Ephesus and other cities.

900 B. C.—Lycurgus, Lawgiver of Sparta

About 900 B. C., while kings were being overthrown in most of Greece and oligarchies established, Lycurgus devised a system of military training for the Spartans.

800 B. C.—A Period of Wider Colonization

From 800 to 600 B. C. the Greeks established trading stations on the shores of the Mediterranean and Black seas.

776 B. C.—The First Olympian Games

Each fourth year the Olympian games were celebrated at Olympia in honor of Zeus, "the father of the gods." Here athletic and intellectual contests took place. It was a meeting place for all Hellas, and here treaties were proclaimed. During the month of the games all wars were suspended.

725 B. C.—The Ephors of Sparta

In 725 B. C. a step was taken toward democracy in Sparta. At that time the assembly elected ephors, who became the chief rulers. Spartan civilization was essentially military.

ROME

510 B. C.—Kings Expelled
There were two parties in Rome, patricians and plebeians. In 510 B. C. the patricians drove out the King and set up an oligarchy.

493 B. C.—The Tribunes
When the kings were overthrown, the nobles gained power but the people were reduced to a kind of slavery. In 493 B. C. the plebeians revolted and secured tribunes to protect them.

451 B. C.—The Decemvirs
The plebeians had long clamored to have the laws published. Finally in 451 B. C. the Decemvirs had them engraved on 12 stone tablets and set up in the market place. They were now known to all the Romans.

GREECE

621 B. C.—Draco's Laws
The nobles were forced to allow Draco to draw up a written code of laws. They were so harsh that it was said they were "written in blood."

594 B. C.—Solon's Constitution
In 594 B. C. Solon made a new constitution. This freed the debtors, limited the amount of land each citizen could hold and foreshadowed a democracy.

560-527 B. C.—Pisistratus, Tyrant of Athens
In 560 B. C. Pisistratus made himself tyrant. His rule was mild and wise. He beautified Athens and invited learned men, poets, painters and sculptors to come to the city.

509 B. C.—Constitution of Cleisthenes
In 509 B. C. Cleisthenes made a new constitution which changed Athens into a democracy, enlarged the powers of the assembly and increased the number of citizens.

500 B. C.—Greek and Oriental Civilizations Join Battle
The revolt of the Ionian Greeks and their subjection by Darius postponed the inevitable struggle between Greece and Persia for ten years.

490 B. C.—Battle of Marathon
A great Persian army was defeated by the Athenians under Miltiades.

480 B. C.—Battle of Thermopylæ
After a gallant resistance the Spartans under Leonidas were defeated by the Persians under Xerxes.

480 B. C.—Battle of Salamis
Themistocles had made Athens a great naval power. At Salamis the allied Greeks won an overwhelming victory over the Persian fleet.

479 B. C.—Battle of Platæa
Under the leadership of Sparta the Persians were defeated at Platæa and compelled to withdraw from Greece.

477 B. C.—Confederacy of Delos
Aristides organized the Ionian cities and Athens into the Confederacy of Delos, which later became the Athenian Empire.

461-404 B. C.—The Athenian Empire, Age of Pericles
Athens was the capital of a great island empire whose cities were powerful, wealthy and possessed of much culture. The empire was governed under the constitution of Cleisthenes. The assembly was supreme and Athens was a pure democracy. Any citizen, whether a member of the assembly or not, could propose laws and urge their adoption. The "leaders of the people" were often not members at all.

As "leader of the people" Pericles came to exercise great power in the assembly. His great purpose was to secure both the material and the intellectual greatness of Athens. He encouraged learning and made the city one of the most beautiful in the world. Great poets, artists, scientists, historians and philosophers made their home in Athens. The great men of the period include the sculptor Phidias, the dramatists Æschylus, Euripides and Sophocles, the historian Herodotus and the philosophers Anaxagoras, Socrates and Plato. Though stripped of her physical power at the end of this glorious period, Athens continued for centuries to shape the literature, art and thought of Europe.

558-529 B. C.—Cyrus the Great, Founder of the Persian Empire

The Medes and the Persians by 625 B. C. had established a monarchy, and in 606 B. C. they conquered Assyria. In 606 B. C. the Oriental world comprised Babylon, Egypt, Lydia and Media. In 559 B. C. Cyrus, a Persian prince, revolted and established the Persian Kingdom By 539 he had conquered Media, Lydia and Babylon. He allowed the Jews, who had been conquered by Nebuchadnezzar, to return to Palestine. His son Cambyses conquered Egypt and united the Oriental world into one great monarchy.

Zoroaster founded the religion of the Persians. He taught that there were always two opposing powers in conflict, the one good and the other evil, and that man should be guided by good impulses and should fight for what is good and right.

522-485 B. C.—Darius, the Organizer of the Persian Empire

Darius was the organizer and consolidator of the Persian Empire. Though a great general, he is best known for his legislative and financial abilities. He divided his vast dominions into provinces. Over each province he placed a satrap, or governor. Military power was given to a separate officer so that the chances of revolt were lessened. He regulated the taxes and decided what each satrapy was to pay. The tribute collected yearly amounted to over $22,000,000. Darius issued a new coinage of great purity. He built splendid roads connecting the satrapies, and at frequent intervals he built posting-stations and inns, where relays of horses were kept. Dispatches were often carried from Susa to Sardis, a distance of 1500 m., in six days. To each satrapy he sent a secretary, known as the "King's Ear," who reported to him. At frequent intervals he sent out a royal representative, known as the "King's Eye." This officer had power to arrest a satrap and bring him to trial. In 500 B. C. this powerful and well-organized imperial monarchy came into conflict with Greece.

470 B. C.—Themistocles, a Persian Tyrant

About 470 B. C. when Athens was just entering upon the most glorious years of her existence, Themistocles, the hero of Salamis, was ostracized largely through Spartan influence at Athens. He sought refuge in various parts of Greece, but he was finally compelled to leave his country. He appealed to Artaxerxes, ruler of Persia, for aid, and the son of Xerxes treated him with marked respect, and appointed him tyrant of a city in Asia Minor.

ROME

390 B. C.—The Invasion of the Gauls
In 390 B. C. the Gauls sacked Rome. They withdrew on the payment of a ransom.

367 B. C.—The Licinian Rogations
Licinius, the tribune, secured a law whereby one of the consuls was to be a plebeian.

338 B. C.—The Latin War
In 338 B. C. the Latin allies revolted. They were defeated by the Romans. The Latin cities were now allowed to trade only with Rome. Rome won over the Latins by promising them Roman citizenship in time.

326-290 B. C.—The Samnite War
In several wars the Romans defeated the Samnites and so gained control of all of Italy except the Greek cities of the South.

275 B. C.—War With Pyrrhus
Tarentum, a Greek city, called on Pyrrhus, King of Epirus, for help against the Romans. This great general was finally defeated at Beneventum. Rome was now mistress of Italy.

CARTHAGE

The Great Empire of Carthage
Carthage was located on the north coast of Africa near what is now the city of Tunis. It was founded by the Phœnicians about 850 B. C. Due to its fine harbor it soon ranked as one of the most important cities on the Mediterranean. Carthage gradually extended her domain until it included all of North Africa, the islands in the western part of the Mediterranean, and parts of Spain and Gaul.

In 480 B. C., while Greece was engaged in the great struggle with Persia, Carthage attacked the Greeks in Sicily. A great battle was fought at Himera, near Syracuse, in which the Carthaginians were defeated. This was one of the decisive battles of the world. Together with that of Salamis it decided that the Semitic nations were not to rule the West. The government of Carthage was much like that of Rome. The Carthaginian constitution gave the people a stable government under which they lived in peace and contentment. By means of a great navy Carthage gained much of the trade of the Mediterranean. However, she treated her subject states badly, and hired soldiers to fight for her. This was to prove an element of weakness in the irrepressible conflict with Rome.

In 264 B. C. Rome was one of five great powers, the others being Carthage, Macedonia, Syria and Egypt. In the struggle for supremacy Rome was to absorb them all.

ROME AND CARTHAGE JOIN BATTLE

264-241 B. C.—The First Punic War
The war between Rome and Carthage began in Sicily. The Romans built a fleet and defeated Carthage on the sea. Carthage ceded Sicily to Rome, and after a time Corsica and Sardinia were also added.

218-202 B. C.—Hannibal's Invasion of Italy
Hannibal conquered southern Spain, attacked Saguntum, led his army across the Alps and defeated the Romans at the Trebia and at Cannæ, but failed to capture Rome. Finally the Romans carried the war into Africa.

202 B. C.—Battle of Zama
Hannibal left Italy to defend Carthage, but in the Battle of Zama he was defeated by Scipio, his first and only defeat, and Carthage became a dependent ally of Rome.

190 B. C.—The Romans Invade Asia
Antiochus, the "Great King" of Asia, had sheltered Hannibal and had seized parts of Greece. At Magnesia the Romans shattered the power of Syria, and this country became a dependent ally of Rome.

146 B. C.—Carthage and Macedonia, Provinces of Rome
The Romans defeated Philip V of Macedonia in 197 B. C. at Cynoscephalæ. In 146 B. C., after the Battle of Pydna, Macedonia became a Roman province. In 146 B. C. Rome destroyed Carthage and the territory became a Roman province.

In the long wars between Carthage and Rome, Carthage lost her empire and was reduced to a Roman province.

GREECE

431-404 B. C.—The Peloponnesian War

In 431 B. C. began the long war between Athens and her allies and Sparta and her allies. For years, under the guidance of Pericles, Athens held out against her rival, but a great plague which broke out at Athens, and the assistance which Persia rendered Sparta, finally turned the scale. The Athenians were defeated in a great sea fight at Ægospotami.

404-371 B. C.—Spartan Supremacy

Sparta was now mistress of Greece and oligarchies were set up in place of the democracies.

371 B. C.—Battle of Leuctra and Theban Supremacy

In 371 B. C. the Spartans were defeated by Epaminondas, a Theban general. Thebes was head of Greece until 362 B. C., when Epaminondas was killed at Mantinea.

338 B. C.—Battle of Chæronea

A new power had developed in the North. Philip of Macedon in 338 B. C. defeated the combined Greek forces at Chæronea. Macedonia was now head of Greece.

PERSIA

Persia

Persia aided Sparta in the Peloponnesian War by furnishing ships and money to the Spartans.

The Ten Thousand

Cyrus, a younger brother of Artaxerxes, ruler of the Persian Empire, tried to win the crown for himself. Besides a large army of Persians he had 10,000 Greek mercenaries, mostly Spartans. Cyrus was killed in battle. Though in the heart of Persia this handful of Greeks under the leadership of Xenophon, the Athenian, in 401 B. C., fought their way back to the coast. The Retreat of the Ten Thousand showed the weakness and cowardice of the Persians.

331 B. C.—Alexander, Master of the Græco-Oriental World

Alexander, son of Philip of Macedon, crossed the Hellespont in 334 B. C. with 35,000 men and defeated the great armies of Persia at Granicus, Issus and Arbela. He was now master of the Græco-Oriental world. He made Babylon his capital, built many Greek cities and introduced Greek culture into Asia and Egypt. He died at the age of 32 and his vast empire fell into fragments.

323-280 B. C.—The Wars of Succession and Division of the Empire

Upon the death of Alexander the Great his generals fought for different parts of the empire. By 280 B. C. Ptolemy controlled Egypt; Seleucus, Syria; and another general, Macedonia. Many Greek cities were built and Greek culture was extended.

GREEK CULTURE WORLD-WIDE

The century and a half from 300 to 150 B. C. constituted a period in which the new Hellenism became the prominent factor in the intellectual development of the world. Athens was still in many respects the center of learning, but other cities like Antioch, Rhodes, Pergamos and particularly the new city of Alexandria shared with Athens her reputation for culture and refinement.

Painting and Sculpture. During this period much attention was devoted to painting, sculpture, oratory, science and philosophy. The Apollo Belvedere, the Venus of Milo, the Dying Gaul and the Laocoon group are a few of the great pieces of statuary that have come down to us from that early time.

Libraries and Museums. Books on all subjects of learning multiplied rapidly. Libraries sprang up in every large city. The museum of Alexandria contained upwards of 500,000 volumes in manuscript form. The museum was really a great university with hundreds of students from all parts of the world. There were botanical and zoological gardens containing collections of rare plants and animals.

Advance in Science and Mathematics. Great progress had been made in the sciences and mathematics. Every city had its group of scientists carrying on research work. Aristotle wrote a natural history of 50 volumes, based largely on a study of the many collections of animals his great pupil, Alexander, sent to him. Aristotle discussed the theory of the rotundity of the earth, advancing every proof of sphericity now recognized except that of actual circumnavigation. Euclid wrote his textbook in geometry, which, until recently, was considered a valuable text on that subject. The Hebrew Scriptures were translated into Greek. Truly, this period was a wonderfully progressive and fruitful age.

ROME MISTRESS OF THE WORLD

133-121 B. C.—Attempts at Reform by the Gracchi

After the Battle of Magnesia Rome was ruler of Italy, Macedonia, Asia, Spain and Africa. These conquests changed the character of the Romans. The citizens at Rome were fast becoming a rabble led by the nobles, and slave labor took the place of free labor.

Tiberius Gracchus, a tribune, introduced reforms by passing an agrarian law which tended to re-create the class of small landowners. Tiberius also tried to give citizenship to the Latins, but the Romans turned against him and he was assassinated.

Gaius Gracchus in 123 B. C. passed an agrarian law and founded colonies of poor people in Italy and the provinces. He, too, was killed in a riot by the nobles.

106-78 B. C.—Civil War. Marius and Sulla

In 102 B. C. the Cimbri and Teutones invaded Italy, but the consul, Marius, annihilated them. Marius now became leader of the people. A civil war followed in which Sulla restored the senatorial rule.

78-48 B. C.—Civil War. Pompey and Cæsar

A revolt of the gladiators took place in 71 B. C., but they were defeated by Crassus and Pompey. Pompey extended the Roman control to the Euphrates. Cæsar, Pompey and Crassus divided the Roman world among themselves. Crassus soon after was killed in the East. Cæsar conquered Gaul and Britain. Then Cæsar and Pompey quarreled and Cæsar became master of Italy. In 48 B. C. he defeated Pompey at Pharsalia, made Cleopatra Queen of Egypt and brought Asia Minor and Africa under his sway.

48-44 B. C.—Cæsar Master of the Roman World

Cæsar felt that the only way to save Rome was to change the government from a republic to a monarchy resting on the people. He equalized and reduced taxation, organized a land commission like that of the Gracchi, rebuilt Carthage, ordered a census taken, had the laws codified and introduced a new system of provincial government. Public buildings were introduced in all parts of the empire and citizenship was enormously increased. In the midst of these reforms Cæsar was assassinated by a band of nobles.

31 B. C.-14 A. D.—Establishment of the Empire

Cæsar's heir was his nephew Octavius, known to history as Augustus. Octavius, Antonius and Lepidus defeated Brutus and Cassius at Philippi in 42 B. C. Civil war broke out between Octavius and Antonius and the latter was defeated. Octavius, now sole ruler of the Roman world, carried out the plans of Cæsar. He established a postal system, revised the list of senators and admitted members from the provinces.

284-337—Diocletian and Constantine

A long period of peace followed the reign of Augustus, but grave disorders appeared during the third century. In 284 Diocletian established a system whereby there were two Augusti and two Cæsars, who ruled different parts of the empire.

Constantine became emperor in 312. He changed the form of government, and transferred the capital to Byzantium (Constantinople). Constantine publicly identified himself with Christianity and by the end of the century it had become the State religion.

THE GOOD ROMAN PEACE OF NEARLY 400 YEARS

Beginning with 27 B. C. and continuing for nearly 400 years the Roman Empire, comprising the civilized world and having an area equal to that of the United States and a population of over 100,000,000 people, enjoyed the "good Roman peace."

GOVERNMENT. The government was directed from Rome. The lawmaking body was the Senate, which as a rule was composed of distinguished men whom the emperors invited to Rome from all parts of the world. The Senate gave the empire a stable government and made many reforms. Taxes were equalized, a uniform system of coinage was introduced and a postal system was organized. The laws were administered with impartiality and justice. The rights of women were recognized in law. The cities enjoyed a large degree of self-government.

INDUSTRY AND COMMERCE. While agriculture was the chief industry, manufacturing also flourished. Parts of the African desert were reclaimed by irrigation. Good roads ramified in all directions from every city in the empire. Communication between distant parts of the realm was rapid and safe. Trade flourished everywhere.

ARCHITECTURE was the chief art, and beautiful buildings, some of them of colossal size, were erected in every city. The two most famous buildings were the Pantheon and the Colosseum.

EDUCATION was common among the higher classes. In the larger cities colleges and universities were established by the government. In the smaller cities elementary schools were organized. All branches of learning flourished as never before.

CHRISTIANITY slowly gained ground among the masses in spite of the frequent persecutions. The Church was organized upon the basis of the political divisions of the Empire and finally the entire West came under the general jurisdiction of the Bishop of Rome, who assumed the title of Pope.

THE BARBARIAN INVASIONS
AND THE
FALL OF THE ROMAN EMPIRE OF THE WEST

376—The West Goths Enter the Empire

The West Goths, fleeing before the terrible Huns, were allowed by Valens, Emperor of the East, to settle south of the Danube. Valens also agreed to furnish provisions to the Goths. The Roman officials, however, failed to deliver the food supplies, and so the Goths marched on Constantinople. At Adrianople Valens was defeated and killed. Theodosius, his successor, who finally restored order, was the last emperor who ruled over the united empire. Upon his death in 395 the empire was divided between his sons, Arcadius taking the East and Honorius the West.

410—Alaric Sacks Rome. West Goths Settle in Spain

Alaric, leader of the Goths, sacked many Greek cities. He was finally driven out of Greece by Stilicho, the great general of Honorius. After the death of Stilicho in 410 Alaric sacked Rome. Ataulf, his successor, led the Goths into Spain, where he founded the first Gothic kingdom.

451—The Vandals in Africa. Genseric Sacks Rome

The Vandals, forced out of Spain by the West Goths, crossed into Africa and set up a Teutonic kingdom with Carthage as its capital. In 455 under Genseric, their ruler, they sacked Rome.

455—Attila Defeated at Chalons

Attila led his terrible Huns into Gaul. Aëtius, leader of the Goths and the Romans, defeated the Huns at Chalons in 451.

476—Fall of the Western Roman Empire

In 476 Odoacer, a German general employed by Romulus Augustus the Little, dethroned the Emperor and brought the Roman Empire of the West to an end.

400-800—THE DARK AGES

The Institution of Slavery. Each great victory before the peace era had stripped the Roman Republic of many of its best citizens and increased the number of slaves. During the empire the institution of slavery became firmly established. Many Roman citizens, either unwilling or unable to compete with slave labor, left their small farms to go to the cities, where they lived on supplies issued to them by the government and were amused by public games. Large landed estates took the place of the small farms, the peasants became serfs and in the course of time most forms of labor fell into the hands of slaves.

Education. The splendid system of education introduced into all parts of the empire was limited almost wholly to the rich. One of the grave weaknesses of the empire was this lack of popular education.

The Government an Absolute Monarchy. In the course of time the government became a centralized despotism with the Senate reduced to a city council and the emperors supreme. Oriental ideas of government were introduced which made necessary a vast increase in the imperial taxes, and industry sank under the burden.

Decrease in Population. The effects of slave labor and the constantly increasing taxation made poverty and distress common, and the population declined.

Return to Primitive Conditions. Both money and men were lacking to repel the hordes of Goths, Vandals, Franks, Burgundians and other Germanic tribes that poured over the Western world, breaking up the empire and disorganizing civilized society to its very foundations. These peoples destroyed the libraries, great buildings and works of art, and this part of Europe reverted to conditions that prevailed in these regions before their conquest by the Romans. The period from 400 to 800 very properly deserves the name Dark Ages.

Beginnings of Modern Civilization. After the period of confusion and violence that naturally followed the invasions came a time when the Teutons began, gradually, to construct a new society, and the ruins of the older civilization served as a foundation on which to build the modern structure.

Roman Church. The invaders, though not immediately willing to accept Christianity as their religion, rarely interfered with the Church and its government. Through the numerous officials of the Church, who mingled freely with the people, much of Roman law and civilization was made to react on the conquerors. But it was to take many centuries for the new race to develop ideas of government, industrial arts, literature and science to take the place of those which it had destroyed.

ENGLAND

55 B. C.-597 A. D.—Early England

Cæsar began the conquest of Britain in 55 B. C. After a time all of Britain was conquered by the Romans. The Romans built cities, introduced laws, encouraged trade and compelled the Britons to live in peace.

About 418 A. D. the barbarian invasions compelled Rome to withdraw her soldiers from Britain to defend her frontiers on the Danube and the Rhine. About 30 years later bands of Angles and Saxons, barbarians from Germany, invaded Britain. The invaders gradually conquered the island. They destroyed the cities, and Roman civilization died out.

Pope Gregory sent Augustine in 596 with a number of monks on a mission of love to England. He urged the English to become Christians. Gradually these Germanic people were converted to Christianity.

THE FRANKISH KINGDOM

481-511 A. D.—Clovis, the Founder of the Frankish Kingdom

The Franks lived along the lower Rhine. Clovis, their king, defeated the Romans in northern Gaul, and then conquered the various Germanic tribes in western Europe until his power extended over the territory now included in modern France, Belgium, Netherlands and western Germany. He was a brutal conqueror, but he stands out in history as the founder of the modern French nation. He and his followers became orthodox Christians. Clovis supported the Pope in stamping out Arianism among the conquered Germans.

687—Pippin, Second Founder of the Frankish Kingdom

The descendants of Clovis were known as the Merovingian Dynasty. They ruled the Frankish Kingdom for two centuries. During the latter part of their rule the control of the state gradually passed into the hands of officials known as mayors of the palace. In 687 Pippin gained control of the two kingdoms into which the Frankish state had been divided but ruled them as mayor of the palace.

732—Charles Martel and the Battle of Tours

Charles Martel, son of Pippin, while mayor of the palace, defeated rebellious kings and nobles and preserved the kingdom his father had won for the phantom Merovingian ruler. In 732 at the Battle of Tours he defeated the Mohammedan host and thus set a limit to the advance of Asiatics in Europe.

750—Pippin, the First Carolingian King

Upon the death of Charles Martel, his son Pippin deposed the useless shadow ruler, and, with the assistance of the Pope, assumed the crown himself, thus establishing the new Carolingian line.

Donation of Pippin. In 568 the Lombards, a German tribe, entered Italy and appropriated the Valley of the Po. They founded the Kingdom of Lombardy. About 750 the Lombards attacked Rome. In 756 Pippin marched into Italy, defeated the Lombards, and gave to the Pope a strip of territory extending across Italy from Rome to Ravenna. This "Donation of Pippin" constituted the foundation of the temporal power of the Papacy.

768-814—Charlemagne

Conquests of Charlemagne. In 772 Charlemagne, King of the Franks, began the conquest and conversion of the Saxons of north Germany. After 30 years of fighting they finally submitted to his rule and became Christians. The King of Lombardy and the Pope quarreled. Thereupon Charles marched into Italy, defeated the King and placed the iron crown of the Lombards on his own head. Charlemagne then subdued the Saracens, who threatened his dominions from the South, and the Avars, a robber Mongolian nation, who threatened them from the East.

Charlemagne, Roman Emperor of the West. Charlemagne united all the Germanic peoples into one great state. On Christmas day 800 he was crowned Emperor of Rome by the Pope. In 801 an embassy arrived at Aix-la-Chapelle, bearing costly presents from the great Mohammedan Caliph, Harun-al-Raschid, who was as supreme

THE BYZANTINE EMPIRE AND THE EAST

488-526—Theodoric the Great

In 488 Theodoric the Great, as he was called, was commissioned by Zeno, the Emperor of the Roman Empire of the East, to reconquer Italy from Odoacer. Theodoric defeated and killed Odoacer. The East Gothic power extended over Italy and the region north of the Adriatic. The long reign of Theodoric (493-526) brought peace, prosperity and happiness to Italy. Theodoric drained marshes, built harbors and improved agriculture. He lightened taxation, and, though an Arian, respected the religion of his Catholic subjects. The weakness in his reign was that the Goths and Romans dwelt side by side in Italy as two distinct nations governed by their own laws. When Theodoric died in 526 there was no one strong enough to carry on the work he had begun, and the empire fell apart.

527-565—The Eastern Roman Empire

Emperor Justinian was the great legislator and codifier of the Roman law. The law consisted of three kinds; namely, the old laws passed in the time of the republic, the laws passed by the Senate during the first two centuries of the empire, and the ordinances of the emperor. To this body of laws must be added the vast number of writings by the jurists. Justinian appointed a commission of able lawyers with instructions to go through this huge and confused accumulation of material, select the laws that were of permanent value, codify them, and make the comments on them clear and concise. This new code became the law of the empire. After Belisarius and Narses, two of Justinian's generals, had conquered Italy, the code was used there also. From Italy it spread over the West and became the foundation of all law in modern Europe.

596-750—The Mohammedan Empire

Before the time of Mohammed, Arabia played no part in the world's history. It was inhabited largely by nomadic tribes. There was no national government and there was no culture, except near the Red Sea. Suddenly these poor, ignorant, idolatrous people sprang into historic importance by conquering the ancient empires of the East, and the Byzantine Empire of the Greeks and the Romans.

In 596 Mohammed began to preach his new religion. He drew on Jewish and Christian sources for material and recognized Moses and Christ as true prophets. He put much emphasis on the doctrine that "God is one God." He wrote the Koran, the sacred book of the Mohammedans. In 622 Mohammed was compelled to flee from Mecca to Medina. This event is known as the Hegira, and it is the date from which the Mohammedans reckon time.

After the Hegira, Mohammed made many converts. He captured Mecca and entered that city in triumph. He spread his religion by means of the sword. His soldiers were fierce fanatics who believed that the time of a man's death is fixed, and that the joys of paradise come at once to him who dies in battle. Within ten years after the Hegira all Arabia had come under the sway of Mohammed. Syria, Persia and Egypt were conquered by the successor of Mohammed within 15 years after Mohammed's death, which occurred in 632. In 711 the Mohammedans crossed the Straits of Gibraltar and conquered the Visigothic Kingdom of Spain. However, their advance was checked by Charles Martel, who defeated them at Tours in 732.

In 750 Spain became independent and was known as the Caliphate of Cordova.

in the Eastern world as Charlemagne was in the Western world.

CHARLEMAGNE'S CHARACTER AND WORK. Charlemagne was not only a great conqueror but also a great statesman. He divided his empire into administrative districts. At the head of each he placed an officer called a count. *Missi dominici*, or king's messengers, kept him informed in regard to the actions of the counts. He gave his empire a strong central government. He encouraged manufacture and commerce. He favored education and collected libraries. He called learned men from all parts of the world to his capital, and began the organization of a system of education. He failed to Romanize his great Germanic empire because one lifetime was too short to change the manners and customs of the different peoples under his rule. Upon his death his empire fell to pieces, but enduring traces of his great work remained which influenced the later development of Europe.

Mohammedan Civilization

Mohammed set up high standards of morality and forced his followers to live up to them. He favored education and culture. The Arabs absorbed what they could learn from every civilization with which they came in contact. They developed law, science and literature. They translated books from the Greek and became ac-

ENGLAND

830—Egbert

Egbert, King of the West Saxons, conquered all the other kings of England and thus made himself overlord of the whole country.

878—King Alfred and the Danes

During Egbert's time the Danes began to invade England. In 878 the Danes, or Northmen, entered into the Treaty of Wedmore with Alfred, King of England, according to which the Danes were to have the northeastern part of England and the English the southwestern.

Alfred was a good and wise king. He built a navy, introduced military reforms and issued a code of laws. He loved learning, translated books into English and built schools. He was called the "Morning Star of Civilization." At his death the English part of England was closely united. By 954 the descendants of Alfred had won northern England from the Danes and thus reunited England.

1017-1035—Canute

During the latter part of the tenth century there were new invasions of the Northmen. Finally Sweyn, King of Denmark, conquered England, and in 1017 Canute, his son, was crowned king. He was a good ruler and became popular in England. He issued a new body of laws, restored order and kept peace.

Twice he visited his Kingdom of Denmark. He made a pilgrimage to Rome, and his letters to his English subjects show a deep interest in their welfare. His sons were cruel and incapable rulers. In 1042 the English line was restored by electing Edward as king. Edward, better known as the Confessor, lacked the statesmanship of Canute. In 1066 Harold was chosen king.

1066-1087—The Norman Conquest and William I

In 1066 William of Normandy landed in England with a large army. England was not united, and in the Battle of Hastings the English were defeated, and Harold, their king, was killed. The Witan, an assembly of the great men of England, then chose William king. William gave large English estates to his Norman followers on condition that they took an oath to be faithful to him and to perform military service for him. The English and the Normans early began to blend, and the English language was modified by the Norman-French. William refused to swear allegiance to Pope Hildebrand but he remained his friend. Though cruel at times he was a great ruler. He made travel safe and preserved order. He directed commissioners to prepare a Domesday book, which contained a record of all the lands in England, and the amount of taxes the owners had to pay the king.

FRANCE

843—The Treaty of Verdun

Charlemagne was followed by his only son Louis. Louis was a weak king and at his death the empire was divided among his three sons. The brothers quarreled, and after a brief but bloody civil war the disputes were settled by the famous Treaty of Verdun. Lothair secured Italy and a strip of land extending from the Mediterranean

Feudalism

The Carolingian kings were weak and unable to hold what Charlemagne had gained. Under them centralized government gave way just when it was most needed to withstand the new barbarian invasions of the Norsemen, Slavs and Hungarians. After the collapse of the imperial government an institution sprang up known as feudalism. This protected life and property for a time and then degenerated into "feudal" violence and warfare, thus increasing the anarchy prevailing during the tenth and eleventh centuries.

Feudalism was a form of social and political organization based on the ownership of land. The state was broken up into many small fragments, each controlled by a rich and powerful lord who was the protector of the people living in his territory. The lord lived in a castle which was virtually a fort, and in times of danger it became a refuge for the people. From it there issued mailed horsemen who

987—Hugh Capet

Hugh Capet was the founder of a new dynasty, which was to rule France until the monarchy was overthrown by the French Revolution. The Capetians held the Duchy of France which was to become the nucleus of the new French kingdom and nation. For several centuries no apparent progress was made in uniting the many feudal states. But the fact that the succession to the throne was made hereditary enabled the kings to hold to one policy and thus prepare the way for the ultimate organization of a strong central power.

The "Truce of God"

For nearly a century after the death of Hugh Capet central authority was almost wholly lacking in France, and the country was rent by civil and private wars. Famine and misery desolated the land. Finally the Pope intervened. In 1041 the Truce of God was proclaimed, according to which all fighting was forbidden from Wednesday evening to Monday morning, and also on all feast days in Advent and in Lent. While the Church did not succeed in her laudable effort to abolish private war, she did succeed in lessening its evils.

to the North Sea, along the Rhone and the Rhine rivers. Charles received the part west of this region which later became France, and Louis that east of the central region which after many centuries was to grow into the German Empire. Thus the empire of Charles the Great came to an end and in its place were found the outlines of modern France, Germany and Italy.

repelled the attacks of the Norsemen, Slavs, Hungarians and neighboring feudal lords. Gradually the lord gained the ownership of the land and the farmers became serfs. The serfs had few rights. While they were not slaves the law bound them to the soil. They were bought and sold with the land. In theory each lord was the vassal of the king. In practice, however, the lords were quite independent of any central authority. As a result there were innumerable petty wars which destroyed every vestige of peace and order. Many of the nobles became "robber barons."

The intolerable conditions incident to perpetual warfare and brigandage were gradually changed with the development of industry and commerce. The invention of gunpowder and the necessity for stronger central governments gradually resulted in the decline of feudalism.

936-973—Otto I, Emperor of Germany and Italy

The Franks, Saxons, Suabians, Bavarians and Lothairingians, called the five great German "stems," prided themselves on preserving their independence, but in 936 Otto I, a great general and organizer, succeeded in uniting many duchies and making himself master of the German state. He was a great ruler, but ambition dictated a fatal mistake. He joined Italy to his kingdom and in 962 he was crowned emperor at Rome. For centuries the German kings strove to rule over Germany and Italy and to control the Papacy. But in pursuing the phantom power as Emperor of the Holy Roman Empire they were compelled to spend much time in Italy to put down insurrections or subdue the popes. Thus they lost the opportunity of establishing a stable government in Germany and uniting the German people into a nation.

1039-1056—Henry III

Henry III was a great ruler. He reduced the Magyars, Slavs and Bohemians to submission. He organized a strong central government and forced the nobles to maintain peace. He put down simony and favored reforms of the Papacy. Under the popes he appointed, a new and better era was introduced for the Church and the Papacy.

1056-1106—Henry IV and Pope Hildebrand (Gregory VII)

Henry IV was but a child when his father died. The nobles revolted and feudalism gained a strong footing in Germany. In 1059 it was decided that the pope was henceforth to be chosen by a college of cardinals. In 1073 Hildebrand who, as adviser of the popes, had urged many reforms, intended to purify and strengthen the Church, became pope, as Gregory VII. Hildebrand issued a decree forbidding the clergy to marry and denying the right of kings and princes to have a voice in choosing abbots and bishops. Hildebrand also declared that the papal power exceeded that of the kings, and that a pope had the right to remove unjust rulers. Henry refused to relinquish his right to invest bishops and abbots, and a synod of German bishops voted to depose the Pope. Hildebrand answered by excommunicating the King. The princes then associated themselves with the Pope. To win back his crown, Henry appeared, in the depth of winter, barefoot and clad in a penitent's shirt, before the Pope's castle at Canossa, and abjectly apologized for his conduct. The Pope, in a way, forgave him, and Henry returned home humiliated but determined on revenge.

Mohammedan Civilization—Continued

quainted with the philosophy and learning of those ancient people. They distinguished themselves in geography, history, astronomy and especially in mathematics. They made little progress in medicine because their religion forbade dissection. Their industries and commerce were very extensive. They established colonies. Their caravans passed from Bagdad to the Atlantic and to the confines of Asia. From China they imported silks, from India rare woods, spices and steel, and from Africa ivory. But their own manufactured products, such as carpets, silks, glass, sugar, satin and other cloths, steel tools and armor, jewelry and paper, soon rivaled, if they did not surpass, those of the Byzantine Empire.

ENGLAND

1087-1100—William II

William II had his father's ability, but not his love of justice. With the assistance of the English he put down the rebellious Norman barons and restored order. While ill he appointed Anselm, a gentle, learned, holy man, archbishop, but when he was well he quarreled with him because the Bishop persisted in doing what he thought was right in regard to Church matters.

1100-1135—Henry I

Henry I, the "Lion of Justice," kept the barons in order, and took Normandy from his brother Robert.

1154-1189—Henry II, the Lawgiver

During the reign of Stephen, which preceded that of Henry, anarchy prevailed in England. The nobles had built strong castles from which they issued to rob and plunder. Henry II was an energetic and fearless man. He destroyed the castles of the barons and restored order. He sent out judges to decide land disputes and cases of robbery and murder. Even the nobles were subjected to the authority of his courts. The modern jury system had its origin in connection with these courts.

The clergy included not only Churchmen, but all men who had learned to read and write and who wanted to work with their brains. Henry insisted that if a clergyman committed a crime he was to be tried by a State court and not by a Church court. He made his chancellor and friend, Thomas Becket, archbishop, to help him carry out his plans. But Becket declared that Churchmen should be tried by Church courts. This resulted in a quarrel between the King and the Archbishop, and Becket was murdered by overzealous friends of the King. Becket's death gained the victory over Henry. The people considered Becket a saint, and the King found it necessary to relinquish his claim over the clergy and to do penance at Becket's tomb in order to win back his popularity. Henry's dominions comprised England and western France. Henry's government and reforms paved the way for a united English nation.

1189-1199—Richard I

Richard I spent but little time in England. He preferred to live in Normandy. He was a brave soldier and took part in a crusade to the Holy Land. He was known as *Cœur de Lion,* or the Lion-Hearted.

1199-1216—John I and the Magna Charta

John was tyrannical and enriched himself by imposing heavy taxes on rich and poor alike. He quarreled with the clergy and refused to accept Stephen Langton, who had been appointed archbishop by the Pope. John seized the lands of the Church and the Pope excommunicated him. The King then agreed to accept Langton as archbishop and made his peace with the Pope. But the nobles and clergy so disliked his arbitrary rule that they forced him in 1215 to sign the Magna Charta, which declared that the king could not take money from his subjects at his will, and that he could not punish a subject except through the process of law and upon a verdict of a jury. This was a great step in the direction of government by the people.

1265—Simon de Montfort's Parliament

Henry III was a weak and extravagant ruler. He squandered vast sums of money. In an uprising Simon de Montfort defeated the King. In 1265 Earl Simon called a Parliament composed not only of nobles and Churchmen but also of representatives of the counties and towns. This was another great advance in representative government.

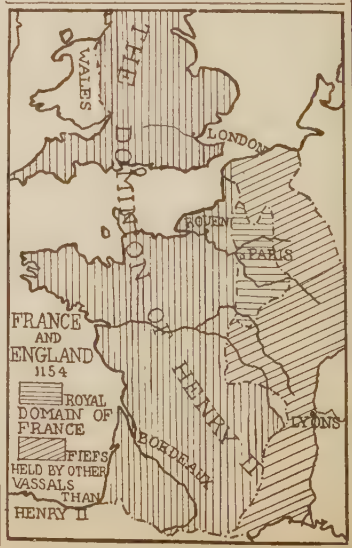
FRANCE

Henry's French Dominions

In 1152 Henry of Anjou married Eleanor, divorced wife of Louis VII of France, thus adding Aquitaine to his dominions, which then comprised territory seven times that controlled by Louis VII.

1180-1223—Philip Augustus

Philip Augustus became king in 1180. In 1204 he began a war against John, King of England, who had his capital at Rouen, France. John fled to England and Philip conquered Normandy and some other minor possessions of John's in France. This was the first great gain in territory made by the Capetian kings.



GERMANY AND ITALY

Henry IV and Pope Hildebrand—Continued

The King was determined to maintain what he considered his rights. Then began the great struggle between the German emperors and the Papacy, which was to last 200 years. The cities of Germany were loyal to Henry. After defeating a rival king he led an army into Italy, drove Hildebrand into exile and had himself crowned emperor by his own anti-pope.

Henry V continued the struggle against the Papacy. In 1122 the Concordat of Worms ended the controversy in regard to investitures by a compromise which, however, was really a victory for the Papacy.

1152-1190—Frederick Barbarossa

The German kings continued to lose power in their struggle with the princes of Germany. But under Frederick I, better known as Barbarossa, monarchy again stood high. Frederick was a great ruler and won back the prestige of Germany by compelling Poland and Denmark to do homage to him. He kept the robber nobles in subjection and granted privileges to the cities.

Frederick renewed the quarrel with the popes. He strove to organize a strong central government in Italy. In this the Pope opposed him, and the powerful Lombard cities made common cause with the Pope against the Emperor. Frederick's army was defeated and he was compelled to recognize the independence of the Lombard cities. Toward the close of the reign the Emperor and the Pope became friends.

In 1187 Barbarossa left on a crusade to the Holy Land, where he was drowned. The German people consider him their greatest popular hero.

1190-1197—Henry VI

Henry VI secured an immense ransom from Richard of England, whom he had held as prisoner. This money enabled him to crush an uprising against him. He was a powerful king and the Papacy became subject to him. By marriage, Henry acquired the Kingdom of Sicily.

1215-1250—Frederick II

Frederick II was supported in his claim to the throne of Germany and of the empire by Pope Innocent III. But after he became emperor Frederick also continued the struggle against the Papacy. He was a great king and statesman, but he devoted but little time to Germany. He finally lost his Italian possessions, and Germany was cut up into many fragments. Thus in the long struggle between the emperors and the popes, the Papacy won its independence, prevented the political unity of Italy and became the head of Christendom. Germany, which had for three centuries been considered the strongest European kingdom, had, meanwhile, lost its central government and in its place were over 300 independent cities and states.

THE EAST

1095-1300—The Crusades

During the 12th and 13th centuries expeditions were undertaken to deliver the Holy Land from the infidel Turks. These wars were known as Crusades. The popes urged knights and soldiers to go to Palestine and fight for the rights of the Christians in the East. In 1095 Peter the Hermit passed through Europe and roused the people to a high pitch of indignation against the unbelievers. He led a great crowd of peasants and other people, most of whom were unarmed, to the Holy Land. But few ever reached Jerusalem, for they were slaughtered on the road by the Hungarians and the Turks.

In 1096 a great army of French and Normans marched in four divisions to the Holy Land. They captured Antioch, and in 1099 recovered Jerusalem and organized the Kingdom of Jerusalem.

In 1187 Jerusalem was captured by the Turks under Saladin. Soon after this Frederick Barbarossa of Germany, Philip II of France and Richard I of England led a crusade to the Holy Land. In 1192 the leaders made a truce with Saladin whereby pilgrims were allowed to visit the Holy Land in safety. Several crusades were undertaken after this, but Jerusalem remained in the hands of the infidels.

The Crusaders came into contact with the superior civilization of the East, and this hastened the development of Europe. The Crusades stimulated manufacturing in Europe, and trade between the East and the West became more general. This demanded the use of money and thus barter was done away with. Feudal lords also accepted money in lieu of services. The kings introduced systems of taxation which helped to make them independent of the lords and barons. Finally all of these things resulted in undermining feudalism and in preparing for a new and better system of government.

ENGLAND

1274-1307—Edward I, the Reformer

Edward favored reforms in the government which were begun by Simon de Montfort. In 1295 the King called what later became known as the Model Parliament, in which all the people were represented. After a time the nobles and clergy acted together and were called the House of Lords, while all the other members constituted the House of Commons. Edward was a wise, firm and just ruler, and England prospered and was peaceful. The King conquered Wales and subdued Scotland. Under Edward II, however, Robert Bruce, King of Scotland, defeated the English at Bannockburn in 1314, and Scotland again became free.

FRANCE

1285—1314—Philip IV

Under Philip IV the barons were subdued, courts were organized, a system of national taxation was introduced and a national legislature known as the States-General was created. Then France felt ready for the great trial of strength with England, which was bound to come.

1338-1453—The Hundred Years' War

A conflict between England and France was inevitable so long as the English held a large portion of French territory. In 1338 Edward II began what is called the Hundred Years' War, because the King of France was trying to gain possession of Flanders, which contained cities that used English wool in manufacturing woolen cloth. But in reality Edward fought to add all of France to his domain, and the French fought to drive the English from their country. The English, with their small but well-organized army, using the terrible long bow, won the glorious victories of Crécy and Poitiers and captured Calais.

During the latter part of the war the English under Henry V won the Battle of Agincourt. But after this great victory the tide slowly turned against the English. Joan of Arc, a peasant girl, pure and simple and without learning, believing that she was called by God to save her country, placed herself at the head of the French troops, aroused their enthusiasm and confidence and defeated the English who were besieging Orleans. The English finally captured her and burned her as a witch. But Joan of Arc was a martyr then, and nothing could stay the French forces.

In 1453 the long war came to a close and all that was left of the English possessions in France was Calais. However, as a result of the war England gained in trade with Continental Europe and Parliament grew in power. France annexed the territories the English lost and thus became a powerful monarchy.

1455-1485—The War of the Roses

At the close of the Hundred Years' War, civil war broke out in England, which was known as the War of the Roses. Two groups of nobles, the House of Lancaster and the House of York, strove for power. In the series of battles that were fought sometimes one side won, and sometimes the other. Finally in 1485 Henry Tudor defeated Richard III at Bosworth. The King was killed and his battered crown was placed on Henry's head, who from that time on ruled as Henry VII. The War of the Roses ruined the barons and thus made possible a stronger central government.

1461-1483—Louis XI

Louis used his power in crushing feudalism and in consolidating and enlarging France. He imposed heavy taxes, which the people, however, were able to pay because agriculture, industry and commerce flourished during his reign. He favored learning. He was a great king and a terrible, for he established that absolutism that was to continue to the Revolution.

The Growth of Cities

Disappearance of Cities. The result of the barbarian invasions was the disappearance of cities which had sprung up in western Europe during the period of the Roman Empire. European society for nearly 500 years was again rural.

Classes of Society. There were three classes of society, the lords, the priests and the serfs. The serf worked for the lord, or paid him for the use of the land in "kind." Farming was conducted in a primitive way because there was no incentive to make the land yield greater returns. Life for the serf had few pleasures. Misery and squalor fell to his lot. There were no schools and the densest ignorance prevailed.

Influence of a Greater Population. With the increase in population came the necessity for using better methods of farming. Private ownership of land was gradually introduced and this reacted favorably on agriculture.

Influence of Crusades on Cities. The Crusades and the introduction of money led to an increase in trade and commerce. Gradually villages were transformed into populous cities. The crude industries were perfected and became more diversified, and material prosperity increased.

Organization of Guilds. In the cities guilds sprang up. Men who did the same kind of skilled labor organized unions for mutual helpfulness. These trade unions were composed of both employers and employees.

GERMANY

The Hussite Wars

John Huss, a Bohemian reformer, wrote and spoke against clerical abuses and openly sympathized with the English reformer Wiclif. The Pope excommunicated Huss, but the people stood by him. In 1415 he appeared before the General Council of Constance under a "safe conduct" from Emperor Sigismund to defend his religious views. But, arrived at Constance, he was thrown into prison. He was, however, granted a public hearing and urged to make a general recantation. This he refused to do and he was burned at the stake. Religious wars ensued but the Hussites were defeated.

SPAIN

Rise of Spain

Charles Martel in 732, at Tours, stopped the farther advance of the Mohammedan power in Europe, but Spain remained in the hands of the Saracens for centuries. All the inhabitants except a small number of mountain people were converted to Mohammedanism. By the tenth century the Mohammedan-Spanish civilization rivaled that of the East. Agriculture, industry, commerce, the arts and sciences, all reached a high state of development. A scientific system of irrigation was introduced. Cordova, the capital, had a population of half a million people. Its university attracted thousands of students from all parts of the world. But this civilization was not destined to last.

Gradually the caliphs allowed power to slip into the hands of their ministers and a decline set in. By the beginning of the 11th century

The Growth of Cities—Continued

The Third Estate, or Burgher Class. In the cities a rich burgher class developed. The burghers compelled the lords to grant charters to cities, defining the powers and privileges of the citizens. The town hall and the cathedral came to be the two greatest buildings in every city. Schools were organized and gradually culture was introduced.

Independent Cities and City Leagues. Many cities became independent and were organized into city republics. Cities combined into leagues for protection against feudal barons, robbers and pirates and to secure better trade conditions. The Hanseatic League comprised 50 of the cities in Germany.

ENGLAND

1485-1509—Henry VII, the First Tudor King

Henry VII created an absolute monarchy. There was no one to oppose him, for many of the nobles were killed in the Wars of the Roses and the people of the middle classes were not in the habit of acting independently of the nobles. Most of the people were tired of the long wars and were satisfied to have a ruler who could introduce peace and order. By means of old sources of income the King made himself quite independent of Parliament. When Parliament did meet, it was usually subservient to the King. During Henry's reign representative government received a check from which it did not recover for two centuries. On the other hand, agriculture and manufacturing increased, trade flourished and great interest was taken in the reading of Greek and Roman books.

1509-1547—Henry VIII

Cardinal Wolsey. During the early part of Henry's reign Cardinal Wolsey had the management of the affairs of State. "Wolsey dreamed of the popedom, while his master dreamed of the universal empire." Because Wolsey failed in getting the Pope to divorce Henry from Catherine, Henry turned Wolsey out of office, seized his immense properties and charged him with high treason. Wolsey died before he could be brought to trial.

The Reformation. Henry induced Parliament to pass laws according to which all matters relating to the Church were to be settled in England. His marriage to Catherine was declared illegal and he married Anne Boleyn. In 1535 Parliament passed an act making Henry "Supreme Head of the Church of England." Henry suppressed the monasteries and used the property thus obtained for himself. Upon Henry's orders the Bible was translated into English. The religion in England was now Catholicism without the pope.

Absolute power. Henry VIII exercised absolute power. Any man who opposed him was likely to be charged with treason and executed. Neither the courts nor Parliament resisted him.

1547—1553—Edward VI

In 1553 under Edward VI the Church of England was made Protestant in doctrine, and all people who refused to conform to the change were persecuted.

1553-1558—Mary

Mary was as absolute a ruler as her father. She induced Parliament to undo the work of Edward and Henry in regard to religion, and the authority of the pope again became supreme. Under Henry VIII both Catholics and Protestants were persecuted. Under Mary all who did not profess the Catholic belief were liable to be punished as heretics.

1558-1603—Elizabeth

The Reformation. During Elizabeth's reign Protestantism was again established in England. The Catholics opposed this action, as did also the Puritans. Catholics and Puritans alike were persecuted.

Mary, Queen of Scots. Mary, Queen of Scotland and cousin of Elizabeth, was expelled from Scotland because of her private behavior and crimes. She fled to England for protection. The government, fearing an uprising in favor of Mary, kept her a prisoner for 19 years. Finally Mary plotted against the life of Elizabeth and in 1587 she was tried and executed.

1588—The Armada. Philip II, King of Spain, sent a great fleet of war vessels, carrying a large army, to conquer England for himself and the Pope. But the "Invincible Armada" was defeated by the English fleet and England was saved. During the war Catholics and Protestants vied with each other in fighting for their country.

England at the Close of Elizabeth's Reign. Many skilled workmen left the Continent during the religious troubles and settled in England. Manufacturing increased rapidly and manufactured goods were carried by English vessels to all parts of the world. Wealth was rapidly increasing. It was an age, also, that produced many writers. Shakespeare brought the drama to its highest stage of perfection and national life took on its modern form.

FRANCE

1498-1515—Louis XII

Louis XII conquered Milan and in 1500 sold to Ferdinand of Aragon his share of the Kingdom of Naples. In 1512 the French lost Milan and were expelled from Italy.

1515-1547—Francis I

Francis carried on many wars with his great rival, Charles V of Spain, in which he wasted the resources and strength of his country. He was no match for the Spanish monarch, the ablest statesman of his age. But though the reign of Francis was a great misfortune to France, the people adored him in spite of his defeats in war and his moral weaknesses, and were content to live under a master who allowed them no constitutional rights.

1562-1595—Civil Wars

From 1562 to 1595 France was rent by religious wars between the Catholics and the Protestants. The French Protestants became known as Huguenots. Francis I and Henry II had persecuted them. Catherine de Medici, the mother of the three successors of Henry II, induced the King to sign an order according to which 2000 Huguenots were put to death in Paris on St. Bartholomew's Day in 1572.

GERMANY

The House of Hapsburg

In Germany the House of Hapsburg, which controlled the Duchy of Austria, steadily grew in power. In 1438 the imperial title was made hereditary in the Hapsburg line. By marriage, Maximilian, Emperor of Germany from 1493 to 1519, joined Netherlands to his possessions in southern Germany. Maximilian tried to organize a strong central government in Germany but he failed because of the opposition of selfish nobles.

1517-1555—The Protestant Reformation

MARTIN LUTHER. Luther was a monk who adopted the doctrine of "justification by faith." This led him to oppose the abuse of indulgences issued by the Church. In 1517 he nailed on the door of the church in Wittenberg his 95 theses in which he attacked the sale of indulgences.

AT THE DIET OF WORMS. In 1521 Charles V summoned him to appear before the Diet of Worms. Here he reaffirmed his doctrines. The Diet placed him under the ban of the empire and ordered his books to be burned. Safely hidden in the Wartburg castle Luther translated the Bible into German.

LUTHERAN DOCTRINES SPREAD. The many wars of Charles, in which he needed the support of his German subjects, prevented him from taking steps to stamp out the growing heresy, and thus the new teachings spread.

PROTESTANTS. Because the Lutheran princes protested against the action of the Diet of Speyer, which declared that the Edict of Worms should be enforced at once, Luther's supporters were called Protestants.

1555. PEACE OF AUGSBURG. In 1555 the Protestant princes of Germany compelled Charles to accept the Peace of Augsburg, which authorized each prince and each city to choose between Lutheranism and Catholicism.

1556-1564—Ferdinand

In 1556 Charles V bequeathed the Archdukedom of Austria to his brother Ferdinand. There were now two branches of the House of Hapsburg, that of Spain and that of Austria. Ferdinand added Bohemia and Hungary to his dominions.

The Counter Reformation

Soon after the Protestant Reformation began many practices of the Church which had irritated the people were abolished by the Church, and only leaders of religious thought could hope to become cardinals. Ignatius Loyola in 1540 founded the Order of Jesuits, the members of which pledged themselves to lead pure, upright lives, to be devoted to the cause of the Church. These movements infused a new life into the Church.

SPAIN

Rise of Spain—Continued

the Christians had established several small states which held out against the Saracens. In 1469 Castile and Aragon, which had grown into strong states, were united under Ferdinand and Isabella. The union of these two states created the Kingdom of Spain.

In 1482 Ferdinand and Isabella began the conquest of Granada, the last and most powerful of the Mohammedan states. One city after another was captured by the Christians, and finally in 1492 Granada, the capital, was forced to surrender, and the Mohammedan power in Spain came to an end.

1516-1556—Charles V

Charles V inherited an enormous amount of territory. From his father he received Netherlands, from his grandfather Ferdinand, Spain and Naples, and from his grandfather Maximilian, Austria. This great inheritance was increased by Cortez, who conquered Mexico, and by Pizarro, who conquered Peru. In 1519 Charles was elected Emperor of Germany. During his reign Spain was the greatest power in Europe. He had several wars with his rival, Francis I of France, in most of which he was successful. In 1532 he led the united forces of his empire against the Turks, who threatened Germany, and compelled them to withdraw. In 1539 he chastised the city of Ghent, where he was born, because it had refused to pay the exorbitant taxes he had levied. He was unable to put down the Reformation in Germany, and in 1555 he entered into the Peace of Augsburg. In 1556 he abdicated in favor of his son Philip. In his will he urged Philip to root out heresy in his dominions.

1556-1598—Philip II

Philip II introduced the most crushing despotism in Spain, using the Inquisition for both religious and secular purposes.

NETHERLANDS. Before the time of Charles V the people of Netherlands, through ingenuity and hard work, had reached the highest state of industrial development attained by any people in Europe. Protestantism had been introduced into the northern provinces and Philip was determined to stamp it out. He used the Spanish Inquisition in a merciless way, but a national hero arose, William, Prince of Orange, who freed the northern provinces from Spain. Spain, however, was too proud to acknowledge the independence of Holland until 1648.

1571. LEPANTO. In 1571 Philip rendered a service to the civilized world by totally destroying the great Turkish fleet in a fight in the Gulf of Lepanto off the coast of Greece.

ENGLAND

1603-1625—James I

James and the Catholics—1604. Under James I the crowns of England and Scotland were united. The King at first treated the Catholics with less severity than they had been treated in the previous reigns, but soon reimposed the severe penalties. This resulted in the Gunpowder Plot, which was a conspiracy to blow up the Houses of Parliament. After the failure of the plot the persecutions were carried on sharper than ever.

1604—James and the Puritans. The Puritans presented to the King a great petition favoring certain changes in religion which were discussed at the Hampden Court Conference, but the King opposed every change. In 1611 a new translation of the Bible was completed.

James and Parliament. The absolute rule introduced by Henry VII and exercised by all the Tudors became more autocratic under James. The House of Commons favored leniency toward the Puritans but James was obdurate. The King imposed duties on imports and exports without the consent of Parliament, which resulted in a quarrel in which Parliament more than held its own.

1607-1620. Colonization. In 1607 the first permanent English settlement in America was made at Jamestown. In 1620 a group of English Separatists, who had left England and had lived in Holland for a time, made a settlement at Plymouth. The Separatists believed that every church should be allowed religious independence.

1625-1649—Charles I

1625. The Petition of Right. Charles I quarreled constantly with his Parliaments over money matters. Finally Parliament declared that before voting him money he would have to accept the "Petition of Right," which called for a redress of their grievances. Charles yielded and the Petition of Right became a law. Then Charles decided to rule without Parliament.

1629-1640. Charles Rules Without Parliament. Charles used the Court of the Star Chamber to punish all who dared find fault with his autocratic government. He levied duties on goods without the consent of Parliament, and ordered the counties to pay ship money in place of furnishing him ships. John Hampden resisted but the judges decided he had to pay the tax.

1640-1649. The Long Parliament and the Civil War. Charles interfered with the Scotch Church and led an army into Scotland, but a Scotch army soon forced him to retreat. In his extremity Charles called another Parliament in 1640, which restricted his powers and declared that it could not be dissolved without its consent.

Civil War. Then the King and Parliament each raised an army and civil war began. Charles was finally defeated by Cromwell. Cromwell belonged to the Independents, who believed that every man should be allowed to worship God as he liked. Most of the Parliamentary army was made up of these religious enthusiasts. Charles was imprisoned, and, after Cromwell had driven many of the Presbyterian members out of Parliament, the "Rump" Parliament brought the King to trial and he was beheaded.

1649-1653—The Commonwealth and the Protectorate

The government was now administered by a council appointed by Parliament. Cromwell suppressed a rebellion in Ireland with great cruelty, and conquered Scotland. The government by the council proved a failure. Cromwell expelled the 80 members of Parliament, and the Long Parliament, which had kept the government in its own hands for 13 years, came to an end.

1653-1658—Cromwell

Cromwell was now dictator. He entered into treaties with Netherlands, Sweden, Denmark and France. He preserved peace at home and sustained the power of England abroad. He failed to establish a constitutional government because his government rested on the army. In 1660 a new Parliament asked the son of Charles I to rule as Charles II.

FRANCE

1589-1610—Henry IV

Henry of Navarre, leader of the Huguenots, became king in 1589. In 1593 he turned Catholic, and in 1598 he issued his famous Edict of Nantes, which granted freedom of worship to the Huguenots. Trade and industries revived during his reign. In 1610, in the midst of preparations to assist the Protestant princes in a war against Austria, he was assassinated.

1610-1643—Louis XIII

Louis XIII was ten years old when he became king. Anarchy again threatened France, but this was averted by the strong and wise rule of Richelieu, the famous minister of the King. He made the King supreme in France by crushing the power of the nobles, and by destroying the political power of the Huguenots. He supported the Protestant princes of Germany in their struggle for religious freedom because the success of the princes meant the humiliation of Austria.

1645-1715—Louis XIV

During the first part of the reign of Louis XIV Cardinal Mazarin continued the policy of Richelieu. France humbled both branches of the House of Austria and became a great power in foreign affairs. France continued to be a pronounced despotism, the people having virtually no political rights.

1648. Peace of Westphalia. The interference of France brought the Thirty Years' War to a close. The Peace of Westphalia recognized France as supreme in Europe.

GERMANY

1618-1648—The Thirty Years' War

In 1618 a terrible and devastating religious civil war began in Germany, which exceeded in brutality the civil wars of Rome. The Treaty of Augsburg, 1555, declared that each potentate and city should decide whether the religion of the people should be Catholic or Protestant. Quarrels naturally arose. The Protestant states formed a union under the Elector of the Palatinate and the Catholics formed "The League," with Maximilian of Bavaria at the head. The war was carried on in Germany, but most of the nations of Europe took part in it at various times.

The Danish Period. Tilly and Wallenstein, the famous generals of the Emperor, defeated the Protestant princes in several battles. Then Christian, King of Denmark, came to their assistance. But he was defeated and the cause of the Protestant princes seemed lost.

The Swedish Period. In 1630 Gustavus Adolphus, King of Sweden, came to the rescue. In 1632 he defeated the imperial army at the Battle of Lützen, but Gustavus was killed.

The French Period. France, under Cardinal Richelieu, had helped Gustavus Adolphus with money. In 1634 a French army was sent into Germany. The war now became one for aggrandizement. Richelieu died but Mazarin continued his policy.

1648. The Peace of Westphalia. According to the Peace of Westphalia, the most important event in history since the Treaty of Verdun, the Catholics and the Protestants were put upon the same footing. Alsace was given to France, parts of northern Germany to Sweden, and the Hanseatic League was broken up. National feeling in Germany seemed extinct. At the beginning of the war the population of Germany was 30,000,000; at its close it was 12,000,000.

SPAIN

Expulsion of the Moors

In 1492, upon the fall of Granada, a compact was made with the Moors according to which these people were allowed to retain their own laws, customs and language, and they were permitted to keep their religion. But soon after this, measures were taken by Spain to bring about the conversion of the Mohammedans. In 1500 the Moors revolted. After the revolt had been suppressed with characteristic Spanish cruelty, the Moors were forced to choose between conversion or banishment. Though most of the Moors chose the first alternative, it did not save them from continued acts of oppression. Charles V became incensed at them when he discovered that many of them while professing Christianity in public secretly clung to the faith of their fathers. Philip II issued an edict forbidding the Moors to speak or write in Arabic. As a consequence many uprisings of Moors took place. Finally in 1609 Philip gave these unfortunate people but three days in which to leave Spain.

The loss of these progressive people who had established systems of irrigation in Spain, who had developed manufactures and commerce, who had introduced the cultivation of silk, rice and sugar, who, in brief, constituted the backbone of the industrial life of Spain, was a fatal blow to the country. Spain now rapidly sank to the position of a second-rate power.

ENGLAND

1660-1685—Charles II

PARLIAMENT AND RELIGION. Parliament hated the Dissenters and was afraid of the Catholics. When the King suspended the penal laws against the Catholics and the Dissenters, Parliament objected, and the King gave way. The Prayer Book of the Church of England was the only form of public prayer allowed in the land.

PARLIAMENT AND TAXATION. Parliament opened a new era in the financial history of England and representative government by gaining control of taxation. Charles made himself partly independent of Parliament by accepting large bribes from Louis XIV of France for his neutrality in the Continental wars. But when Parliament did vote him money, it controlled the expenditure of the money.

1679. THE HABEAS CORPUS ACT. The King reluctantly gave his consent to the Habeas Corpus Act, which provided for a speedy and public trial of a person charged with a crime.

1685-1688—James II

James II tried to reestablish Catholicism. In 1688, when a child was born to his Catholic wife, a group of prominent men invited William of Orange to come to England and take possession of the government. William landed in England with a small army and James fled to the Continent. The crown was offered by Parliament to William and Mary under certain conditions. They accepted the conditions and thus after 200 years of absolute rule the peaceful Revolution of 1688 made Parliament supreme in the government of England.

1689-1702—William and Mary

The Declaration of Rights passed by Parliament in 1689 again stated the fundamental rights of the English nation.

PARLIAMENT AND RELIGION. The Toleration Act allowed the Dissenters to worship in their own churches. After a time the Catholics were allowed to worship in their own way. But neither Dissenters nor Catholics could hold office.

WILLIAM'S WARS. William had to fight for his crown. Many battles were fought before the Irish and Scotch Highlanders accepted him as king. Each year, also, William went to Netherlands to fight the armies of Louis XIV of France.

THE KING AND PARLIAMENT. Parliament was supreme and passed acts restricting the power of the sovereign. William did a great thing for England by abiding by the regulations of Parliament, and ruling strictly according to law. War clouds again gathered during the last few years of his life. He died in 1702, eight years after the death of his wife Mary.

1702-1714—Queen Anne

ACT OF SETTLEMENT. In 1701 Parliament had passed the Act of Settlement which provided that the crown, upon William's death, should go to Anne, the sister of his wife, and daughter of James II.

FRANCE

Louis XIV—Continued

WAR AGAINST NETHERLANDS. In 1661 Louis XIV took the government into his own hands. His favorite saying was, "I am the state." He never convened the States-General, and made France a stronger absolute monarchy than ever. He advanced his power in Europe by carrying on many successful wars, the most important of which was the one against Netherlands and the United Provinces. In 1679 a peace was made, according to which Louis kept Spanish Netherlands. During this war Charles, King of England, had been in the pay of Louis.

REVOCATION OF THE EDICT OF NANTES, 1685. In 1685 Louis revoked the Edict of Nantes. Persecutions of the Protestants followed, which caused many of the most skillful and industrious of the French people to leave France for England and other countries.

War of the Spanish Succession

In 1700 the King of Spain died, after bequeathing all his dominions to Philip V, grandson of Louis XIV.

In 1701 William, King of England, made a treaty known as the "Grand Alliance," according to which England, Holland, Austria and Prussia agreed to act together in preventing the union of the French and Spanish dominions. William had placed Marlborough at the head of the English and Dutch forces, and after William's death Marlborough, whose wife and the Queen were good friends, possessed great power.

Marlborough and Prince Eugene, the two generals of the allies, won the famous battles of Blenheim, Ramillies, Oudenarde and Malplaquet. The allies favored an Austrian prince for the throne of Spain, but when the prince became Emperor Charles VI they were satisfied to have Philip V keep the Spanish throne on condition that he would renounce his claim upon the French throne.

PEACE OF UTRECHT. According to the treaty Spanish Netherlands, Naples, Sardinia and Milan were given to Austria; Gibraltar and the Island of Minorca and a large part of the French possessions in the New World were given to England. From this time on England and France were destined to be on opposite sides in the long Continental wars.

POSITION OF FRANCE. For half a century the history of France had been the history of western Europe. The long wars and the despotic rule of the kings had weakened France and left her people a heritage of misery and discontent, which in the latter part of the century were again to make her the center of European history.

GERMANY

Rise of Prussia

During the 15th century, Emperor Sigismund granted to Frederick, Count of Hohenzollern, the March of Brandenburg. In the hands of the Hohenzollerns Brandenburg was to grow into one of the greatest kingdoms of Europe.

In 1611 Prussia, a small German state on the Baltic Sea, a fief of the King of Poland, was united with Brandenburg. Frederick William, the Great Elector, secured the independence of Prussia and organized a strongly centralized government. He became the champion of Protestantism and acquired additional territory by the Peace of Westphalia in 1648. In 1701 his son Frederick was crowned King of Prussia.

POLAND

Poland

In 1386 Poland and Lithuania were united. In 1466 Poland annexed a part of Prussia. Poland then comprised the large part of central Europe, extending from the Baltic almost to the Black Sea. It was one of the greatest states of Europe. During the Thirty Years' War Poland placed a fleet at the disposal of the Emperor.

1674-1696—John III

In 1674 Sobieski, a gallant general, was chosen king as John III. In 1683 an army of 250,000 Turks laid waste the plains of Hungary and appeared before Vienna. The Emperor of Germany appealed to the Polish ruler for help. Sobieski, at the head of a Polish and German army, totally destroyed the Turkish power. During divine service held in the Cathedral of Vienna after the victory, a priest suddenly exclaimed, "There was a man sent from God, and his name was John."

RUSSIA

Rise of Russia

About the middle of the ninth century Rurik, a Norseman, conquered the Slavs and Finns near the Baltic and thus laid the foundation of Russia. In the middle of the 13th century, Russia became subject to Genghis Khan, the great Tartar, or Mogul, King of Asia. In 1462 Ivan the Great began the reorganization of the country and freed his kingdom from the Tartars. The Russians at this time were a semibarbarous people. Ivan the Terrible crushed the power of the Tartars and extended his dominions to the Caspian Sea. In 1547 he assumed the title of Czar. The conquest of Siberia was begun by Ivan, and gradually the dominions of Russia were extended until in 1639 they reached to the Pacific Ocean.

1682-1725—Peter the Great

Peter wrested from Poland a part of her territory and conquered Azov from the Turks. Twice he visited Holland, Germany and England, to study navigation and to learn other things that might be useful to his people. He introduced reforms of various kinds. He issued a new coinage, encouraged learning, built roads and canals, and invited artisans, merchants and artists to live in Russia. He built a navy. He built St. Petersburg and made it the capital of Russia.

Russia and Sweden. In 1700 Russia joined the kings of Denmark and Poland and the Elector of Saxony in appropriating parts of Sweden, but Charles XII of Sweden defeated the Russians at Narva. In 1709, however, his army was annihilated by Peter at Poltava. In 1721 the Swedish war ended with parts of the Baltic lands in the possession of Peter.

His Work. Peter was a despotic and at times a cruel ruler, but he raised his country to a position of great importance in Europe. Russia no longer faced Asia, but western Europe.

ENGLAND

1714-1727—George I

In 1721 George I appointed Robert Walpole chancellor. The King could not speak English and so delegated much power to the cabinet, and especially to Walpole, who received the title of prime minister. There was much political corruption in England during the reigns of George I and George II, but during it all England was growing in wealth and power.

The Silesian War

England helped Austria against Prussia and France in the Silesian War, or the War of the Austrian Succession.

FRANCE

1715-1774—Louis XV

Louis XV was five years old when his grandfather Louis XIV died. The Duke of Orleans made himself regent. He tried to introduce some reforms of government but failed. The government issued a great amount of paper money and floated it by means of the Mississippi Company, but this ended disastrously to the nation. In 1723 the majority of Louis XV was proclaimed.

In the Silesian War France supported Prussia against Austria and England. The peace of 1748, however, discredited France. During the reigns of Louis XIV and Louis XV the great French debt kept increasing steadily. The morals of the nobles at court were scandalous. Madame de Pompadour, the King's mistress, for 20 years made and unmade ministers at will. The nation lay dormant, but soon France was to awake.

1756-1763—The Seven Years' War

In 1754 Maria Theresa, to win back Silesia, entered into an alliance with France, Russia, Sweden and Saxony. It soon became apparent that these powers had decided on the dismemberment of Prussia. In 1755 Frederick made an alliance with England and in 1756 he began the Seven Years' War.

A World-Wide War. The Seven Years' War became a world-wide struggle. It was carried on at the same time in Europe, America and India. Four large armies coming from four different directions invaded Prussia, but the military genius of Frederick was a match for them all and saved Prussia from destruction. In 1757 he defeated and captured a French army at Rossbach. He defeated another army at Leuthen, and, though defeated at times, held his enemies at bay until peace was made.

In America the war was known as the French and Indian War. The English aided by the colonists attacked the French all along the line. In 1759 Wolfe defeated Montcalm at Quebec, which brought the war to a close. In India Clive defeated a native army at Plassey. The naval victories of England established her supremacy on the sea.

Peace was Signed in 1763. The treaty of peace made no change in territory in Europe. In America, France ceded Canada and all her territory east of the Mississippi to England, and the territory west of the Mississippi to Spain, and Spain ceded Florida to England.

1776-1783—The American Revolution

The French and Indian War gave rise to the problem of how the expense of the war should be divided between England and the colonies. England determined to tax the colonies, but the colonies objected to being taxed by a Parliament in which they were not represented. This led to a war between the Mother Country and the colonies.

In 1776 the colonies declared their independence and chose George Washington commander-in-chief. Washington was a great leader in a great cause. Early in the war the Americans lost New York, and for a time Boston and Philadelphia, but in 1777 they captured the British army under Burgoyne at Saratoga. In 1778 France came to the assistance of the colonies, and soon after Spain and Holland also joined in the war against England. Besides carrying on the war against the colonies England was compelled to defend India, Gibraltar and her other possessions in different parts of the world.

In 1781 the Americans, aided by the French, forced Cornwallis to surrender at Yorktown. This ended the war.

In 1783 a treaty of peace was made. According to this treaty England recognized the independence of the colonies, ceded Florida to Spain, and a few islands in the West Indies to France. Thus the colonies won their independence and France and Spain had their revenge, for they had helped the colonies to break away from England.

GERMANY

1730-1740—Frederick William I

Frederick William was a good ruler. Under him the Government of Prussia reached a high point of efficiency. He built up a large and well-trained army, and by rigid economy left a large sum of money to his son Frederick, who succeeded him in 1740.

1740-1786—Frederick the Great

Frederick, ignoring the Pragmatic Sanction, entered Silesia with an army and seized that province. In the war that followed France joined Prussia. Maria Theresa fled to Hungary, where the nobles rallied to her support. England joined Austria against Prussia and France. Peace was made in 1748, but Austria did not regain Silesia.

In America an expedition of New Englanders captured the French fortress of Louisburg. In India the French captured Madras. At the close of the war England returned Louisburg to France in exchange for Madras.

Effect of the Seven Years' War on Germany

At the end of the Seven Years' War Prussia was considered one of the leading European powers, and the conflict between Austria and Prussia was foreshadowed. The German people no longer considered France the leader in thought and manners. National life and patriotism sprang up in north Germany. Intellectual independence found expression in the philosophy of Kant and in the poetry of Goethe, Lessing and Schiller.

FREDERICK THE GREAT. Frederick the Great was not only one of the greatest military leaders the world has produced but he was great also in his work of peace. While a most pronounced despot he considered himself simply "the first servant of the state." He was compelled to keep up a large army, but he kept the taxes down by a system of rigid economy and strict supervision of public officials. He built canals, encouraged manufactures and commerce, laid the foundations of the present school system of Germany and encouraged art and literature.

RUSSIA

1762-1796—Catherine the Great

Catherine deposed her husband, Peter III of Russia, and became Catherine II. She was a great ruler but a most profligate woman.

1772—PARTITION OF POLAND. Catherine entered into an agreement with Frederick the Great and Maria Theresa to dismember Poland. Three successive divisions were made, one in 1772, another in 1793 and the last in 1795. The territory gained by disregarding the law of nations brought Russia into the heart of the European Continent.

1774—CONQUEST OF THE CRIMEA. In 1767 Turkey declared war against Russia. The victorious Russian armies soon reached the Danube, and a Russian fleet, after sailing around Europe and through the Straits of Gibraltar, suddenly appeared in the Black Sea and destroyed the Turkish fleet. Peace was made in 1774 and Russia gained control of the Crimea.

ENGLAND

Inventions

In 1776 Arkwright invented an improved spinning machine. Soon after this a power loom was invented. James Watt in 1781 built steam engines for manufacturing purposes. These inventions revolutionized manufactures and led to the introduction of the factory system.

War Between England and France

For a time after the French Revolution had begun, the English sympathized with the French people in their efforts to reform their government. But when the Reign of Terror set in and the King and Queen of France were executed, the English people were horrified. In 1793 the French minister was ordered to leave England. France then declared war against England. The struggle lasted until 1815.

The war with France had the effect of not only checking reform movements in England but causing a loss in political and social conditions. Ireland, after enjoying a brief period of Home Rule, was joined to England in 1789, being allowed 100 members in Parliament. The colonial acquisitions and the increased trade which came to England during this period were offset by burdensome taxes and dissatisfaction of the people.

War of 1812

In 1812 war broke out between England and the United States, because of the restrictions England placed on commerce. The treaty of peace did not settle any of the disputed questions.

FRANCE

The French Revolution

What It Was. The French Revolution was an effort of the French people to secure political and social freedom. The Revolution was constructive in character, securing many lasting reforms in France and paving the way for many political changes in other European countries.

Abuses Under the Rule of Kings. For centuries France was governed by kings who exercised absolute power. The nobles and the clergy enjoyed unjust privileges. They paid no land tax and they were exempt from military service. The salt tax and the many other indirect taxes were levied in such a way that they bore most heavily on the poor. Nearly all of the taxes were paid by the poor peasant class, who could ill afford it, while the wealthy privileged classes paid only a small fraction of them.

The Work of Men of Letters. Abuses of government alone, however, could not account for the Revolution. There must be active discontent. This was furnished by the men of ideas. Many able writers during the middle of the 18th century, influenced by the reforms in England, espoused the cause of the people. Voltaire stood for religious freedom and Rousseau stood for political freedom.

Attitude of King and Court. The long wars of Louis XIV and Louis XV, and the lavish court expenditures had brought France close to bankruptcy. Louis XVI felt the need of reforms but he was weak and unequal to the task of inaugurating them. His controller-general, the able Turgot, curtailed the expenditures of the government and court, and abolished many privileges of the nobles and the clergy, but the Queen and the court secured his dismissal. Necker, his successor, also tried to introduce necessary reforms but the nobles and the clergy forced his retirement. Then came Calonne, who tried to improve matters by dazzling expenditures of money for court and other purposes, but before long he was compelled to inform the King that France was bankrupt, and that only radical reforms could save the government from destruction.

The Notables Are Summoned. In 1787 the King summoned the leading nobles and clergy for a conference, but they were selfish and opposed the reforms suggested by Calonne.

The States-General Called. In 1788 the King authorized the election of members of the States-General, which had not met for 175 years. There were 557 members of the Third Estate and about that number of nobles and clergy. The deputies to this body met in 1789.

The States-General Changed to National Assembly. Soon after the assembling of the States-General the members of the Third Estate, the representatives of the people, organized themselves into the National Assembly, representing the nation as a whole. Most of the nobles and clergy reluctantly joined them.

The Work of the National Assembly. August 4, 1789, the Assembly swept away the numerous special privileges enjoyed by the nobles, clergy, and middle class in the cities, thus putting an end to feudalism in France. In 1791 the Assembly completed the written constitution which provided for a limited monarchy. Thus great power was given to the people who were not prepared to exercise such power.

The Legislative Assembly. In October, 1791, the regular Legislative Assembly provided for by the constitution began its session. The kings of Europe, fearing their people might imitate the French in demanding reforms, determined to restore the old regime. In 1792 100,000 Austrians and Prussians invaded France, but they were defeated. The Legislative Assembly was replaced by the National Convention.

The National Convention, 1792-1795. In 1792 monarchy was abolished and France became a republic. In 1793 the King was beheaded. Patriotism and enthusiasm again defeated the allies, and civil and political liberty was kindled over Europe. The Belgium Republic was formed. But in France itself came the Reign of Terror, with Robespierre at the head. The radical party was in control during this time of disorder and bloodshed, and many changes

FRANCE

were made in the government, in education and religion. The good and bad seemed to be swept away together but out of it all a new French nation was born. Finally Robespierre was beheaded and the early history of the Revolution came to an end.

THE DIRECTORY, 1795-1799. A new constitution went into effect under which the Directory assumed control of affairs. In 1795 the army under Napoleon crushed the Royalists and saved the Convention. In 1796 the Directory made Napoleon commander of the army in Italy. Napoleon now became the central figure in Europe. After defeating the Austrians in Italy he advanced on Vienna, and in 1797 Austria ceded to France Austrian Netherlands. In 1798 Napoleon planned the expedition against Egypt to cripple the commerce of England. But Nelson annihilated the French fleet at Alexandria, and Napoleon returned secretly to France, leaving his army in Egypt. A second coalition was organized against France. In 1799 Napoleon made himself first consul and later emperor. Thus the Revolution produced its military despot.

THE CONSULATE AND THE FIRST EMPIRE, 1799-1815. For 15 years Napoleon kept Europe in a turmoil of confusion. He set up kings at pleasure. He was at war with most of the powers of Europe. He defeated the Austrians at Marengo and Hohenlinden. England alone held out against him. In 1802 treaties were made with all the countries with which France had been at war. Napoleon now restored order in France. He again established the Christian religion and thus won the support of the Pope. A commissioner codified the laws of France, and the *Code Napoleon* later became the basis of civil law in many countries of Europe.

IMPERIALISM AND FALL OF NAPOLEON. In 1804 Napoleon became emperor. The many republics that had sprung up were changed to kingdoms, only Switzerland remaining free. Europe dreaded Napoleon, and coalition after coalition was formed against him. From 1804 to 1815 the struggle went on. The battles of Austerlitz and Jena made Napoleon supreme and left Prussia prostrate. The Emperor of Austria was forced to surrender the crown of the Holy Roman Empire. Some of the German states then formed the Confederation of the Rhine under Napoleon's protection. By 1811 Napoleon had created a world empire. Only Russia remained to oppose him. In 1812 he invaded that country to capture Moscow and dictate an European peace, but the Russians, aided by the climate, defeated him. Russia, Prussia, England and Sweden now put an army in the field and in 1813 the world Battle of Leipsic made Germany free. Wellington defeated the French in Spain, and in 1814 the allies entered France. Napoleon abdicated and was banished to the Island of Elba. The throne of France was given to the late King's brother, who ruled as Louis XVIII. The boundaries of France were restricted to those of 1791. In 1815 Napoleon returned to France, but was defeated by the English and Prussians at Waterloo. He was sent as a prisoner to St. Helena, where he died in 1821.

RUSSIA

1801-1825—Alexander

During the Napoleonic wars Alexander entered into several coalitions with other European powers against France, and in 1812 Napoleon invaded Russia with a superb army of 400,000 men. He defeated the Russians in several battles and then entered Moscow, which the Russians had abandoned. Soon after his entry a fire broke out which destroyed the city. In the latter part of October Napoleon began his retreat. The weather was severe, and cold and hunger and the attacks of the Cossacks thinned the ranks of the French army. Only 80,000 of the entire army returned. In 1813 the Russians aided the coalition in the Battle of Leipsic, and in 1814 they entered France with the allies.

TERRITORIAL GAINS. During the reign of Alexander I Russia added Finland, Poland, Bessarabia and a part of the Caucasus to her dominions.

The Congress of Vienna

In 1814 a congress of the powers of Europe met at Vienna to reconstruct the map of Europe. Their labors were for a time interrupted by Napoleon's return to France from Elba. The following were the most important political and territorial readjustments made by the Congress:

1. Holland with the addition of Belgium became the Kingdom of Netherlands.
2. Switzerland was guaranteed its independence.
3. Denmark was compelled to cede Norway to Sweden.
4. The independent German states were united in a loose federal union.
5. Poland was reconstructed and united in a personal union with Russia.
6. Austria lost territory in central Europe, but received Venice in exchange for Belgium.
7. The Kingdom of Sardinia was restored, and Genoa was added to it.
8. Prussia lost the Duchy of Warsaw, Slav territory difficult to organize, but gained half of Saxony and other German districts.

Interest was to center in the last three arrangements, for by them Austria's despotic power was weakened, Sardinia was to become a nucleus for the union of Italy, and Prussia, now extending down into the heart of Germany, was to make possible the organization of the German Empire.

ENGLAND

Growth of Democracy

CATHOLIC EMANCIPATION ACT. This enabled Catholics to hold any office to which they were elected.

Only one out of every ten adult males in England, Scotland and Ireland could vote. Many cities had no representation in Parliament.

THE REFORM BILL OF 1832. This abolished 56 "rotten boroughs" and created 43 new boroughs to include the large manufacturing cities, and extended suffrage rights to all who owned or rented a house worth $50 in rent a year.

OTHER ACTS. An act of 1833 freed all slaves in British dominions. A factory act regulated the labor of children in factories. The Municipal Reform Act put the control of the government in each city and borough in the hands of the people.

THE CORN LAWS. In 1848 the tariff on wheat was removed; by 1852 all protective tariffs had been removed, and England has since that time been a free-trade country.

THE CRIMEAN WAR. Russia declared war against Turkey in 1853. In 1854 England, fearing that Russia's success might endanger her route to India, joined France in a war against Russia. It virtually became a war to preserve the integrity of Turkey. At Balaklava the English "Light Brigade" made their memorable charge. Russia was defeated in the war.

FRANCE

1814-1830—Louis XVIII and Charles X

The King issued a charter which gave France a fair degree of self-government. Louis' brother became king in 1824 as Charles X. He joined the Holy Alliance and introduced many reactionary measures.

REVOLUTION OF 1830. In 1830 Paris broke out in open revolt against the government. A provisional government was formed with the aged Lafayette at the head, and Louis Philippe became king.

1830-1848—Louis Philippe

Louis Philippe agreed to abide by the new constitution and thus the Divine Right of Kings came to an end. The right of franchise was given to every one who paid $40 in taxes.

REVOLUTION OF 1848. Louis Philippe opposed the reforms of the liberal party. An uprising in Paris in 1848 resulted in the abdication of the King. The provisional government declared France to be a republic and it established manhood suffrage. Under the new constitution Louis Napoleon was chosen president.

1852-1870—Louis Napoleon

By a *coup d'Etat* Louis in 1851 proposed a new government and was elected president for ten years. Then by an almost unanimous vote he was chosen "Emperor of the French by the Grace of God and the Will of the People."

He joined England and Turkey in a war against Russia in 1854.

In 1859 Napoleon began a war against Austria to free Italy, but an unexpected peace, after several French victories, left Italy at the mercy of Austria.

The Emperor favored the cause of the Southern Confederacy in the United States, and in 1863, despite the Monroe Doctrine, made Maximilian Emperor of Mexico.

Louis Napoleon, though he suppressed liberty, encouraged popular education. During his reign the industries of France flourished and wealth accumulated.

ITALY

The Kingdom of Italy

The Congress of Vienna left Italy "merely a geographical expression." After the flight of Metternich Venice and Milan set up republics and drove the Austrian troops out of northern Italy. The other Austrian states were granted constitutions. The republics in northern Italy appealed to Charles Albert, King of Sardinia, for aid. Charles Albert responded, but in his efforts to free Italy he found himself unsupported by any states except Milan and Venice. He was defeated and abdicated in favor of his son.

VICTOR EMMANUEL AND CAVOUR. Victor Emmanuel, the soldier, and Cavour, the statesman, were to find means for unifying Italy. Cavour instituted many reforms in the kingdom. In 1854 he sent a small but well-organized army to help the allies in the Crimean War.

AUSTRO-SARDINIAN WAR. As a result of this war Lombardy was added to Sardinia.

THE TWO SICILIES JOIN SARDINIA. In 1860 Garibaldi freed the two Sicilies, and the people voted to join Sardinia.

EMMANUEL BECOMES KING OF ITALY, 1861. In 1861 the first Italian Parliament met at Turin and the Kingdom of Italy was a reality. Cavour's statesmanship proved successful.

VENETIA ADDED TO THE KINGDOM, 1866. Italy joined Prussia in the war against Austria and added Venetia to the Italian Kingdom.

GERMANY AND AUSTRIA

The German Confederation

The Congress of Vienna recognized 38 independent German states. To repel invasion these were organized into a very loose confederacy. Austria and Prussia were the leading states, but Austria exercised a sort of presidency over the league.

Policy of Metternich. Metternich, the Austrian statesman and reactionist, was afraid that in a real German Empire Prussia might take the lead. With the states practically independent Austria could hope to dominate affairs. By the aid of the Holy Alliance Metternich stifled liberalism in Germany. The Revolution of 1830 sent a chill throughout Europe. But demonstrations against the governments in the German Confederacy were promptly put down. France however, was lost to the Holy Alliance. In 1833, Austria, Russia and Prussia, under the direction of Metternich, again united to suppress revolutionary uprisings.

The Revolution of 1848. As a result of the risings in March, 1848, following the Revolution in France, the German states granted their subjects new constitutions, and old feudal privileges disappeared. Metternich fled. Hungary and Austria were granted constitutional liberties. A national assembly met at Frankfort to draft a constitution for United Germany. But reactionary forces were soon at work. The Czar helped Francis Joseph put down the Hungarians, who had proclaimed their independence under Kossuth. Charles Albert, King of Sardinia, tried to free Italy, but he was crushed by the Austrian armies. Frederick William IV lost faith in the liberal cause, so nothing came of the Frankfort Assembly. A Prussian league was formed and war with Austria seemed imminent. In 1850 King William submitted to Austria and the German Confederation upon the basis of 1815. The King of Prussia, however, granted his people a constitution and feudalism disappeared forever from Germany.

1861—William I of Prussia

William I was a conservative but he favored German unity. Bismarck, his minister, governed in an arbitrary way and built up a modern army. "Blood and iron," he declared, would succeed in expelling Austria from the league.

The Danish War, 1864. Bismarck induced Austria to join Prussia in a war against Denmark. After a gallant fight the Danes were defeated and Denmark was compelled to cede Schleswig-Holstein to Prussia and Austria.

The Seven Weeks' War With Austria, 1866. In June, 1866, war was declared between Austria and Prussia. All the states in the German Confederation except a few small ones in the north sided with Austria. On July 4, 1866, the Austrian army was defeated at Sadowa. Prussia annexed several of the northern states, including Schleswig-Holstein, and then organized the North German Confederation.

RUSSIA

1801-1825—Alexander I

The Holy Alliance. In 1815 Alexander organized the Holy Alliance, a league entered into by Russia, Austria and Prussia, to maintain religion, justice and order in Europe, but the Alliance was soon used in crushing uprisings for political freedom.

1825-1855—Nicholas I

Revolution in Poland, 1830. In 1830 an uprising in Poland was crushed by Russia, and Poland was made a part of Russia.

The Slavophils. About 1840 the Slavophil movement began. It has continued to the present time. This has for its purpose the Russianizing of all provinces and dependencies and the stamping out of all liberal tendencies in government and religion.

The Crimean War. In 1854 France and England declared war against Russia to prevent the dismemberment of Turkey. Russia was defeated.

1855-1881—Alexander II

Emancipation of the Serfs. In 1861 Alexander II issued the edict of emancipation. The landlords were paid an indemnity to release the serfs from bondage.

ENGLAND

Growth of Democracy—Continued

Reform Bills of 1876 and 1884. The passage of these measures assured the right of suffrage to all self-supporting men, and England became a true democracy.

The Home Rule Bills. In 1886 Gladstone introduced a measure granting Home Rule to Ireland, but it was defeated. In 1893 he again introduced such a bill. It passed the House of Commons but it was defeated in the House of Lords.

The Laboring Classes. Labor legislation has made rapid progress since 1890. By means of the various Allotment Acts the land is gradually being restored to the peasantry.

The Boer War. In 1899 in a war with the Transvaal and Orange Free State, the Boers, after a gallant resistance, were overthrown, and the two republics became a part of the English possessions in Africa.

Colonies. England has over 100 colonies and dependencies. Australia, New Zealand, India, South Africa, Newfoundland and Canada are the most important. Of these, India is a royal colony; the others exercise the power of self-government, except in their relations with foreign nations. In 1867 the Canadian provinces formed a confederation, and in 1901 the five Australian colonies and the Island of Tasmania formed the Commonwealth of Australia. The constitution of the Australian Confederation is more democratic than that of the United States. In May, 1910, the colonies of the Cape of Good Hope, Natal, the Transvaal and the Orange River formed the Union of South Africa.

World War. As a result of the World War Great Britain formally annexed Egypt and the Anglo-Egyptian Sudan. Under the guise of Mandate rule, her territory has been vastly increased since most of the German colonies pass under her control as well as the Turkish provinces in Mesopotamia.

FRANCE

Louis Napoleon—Continued

Franco-German War. To strengthen his government at home Napoleon began the war against Prussia which resulted in the loss of Alsace and Lorraine.

The Third Republic

In 1871 the Paris mob set up a second Reign of Terror. Order was finally restored and the Third Republic was established. In 18 months France paid $1,000,000,000 war indemnity and the Prussian army left France.

French Colonies, Algiers and Tunis. Though both possessions have a good climate and soil, and are in close proximity to France, very few French settle in these countries. France is not a colonizing nation. This is largely due to the fact that the birth rate has been steadily declining for many years.

Alliances. In 1882 Italy joined Germany and Austria in the Triple Alliance and thus completely isolated France in Europe. In 1891 France made an alliance with Russia. In 1904 France entered into a friendly agreement with England which is destined to keep the countries on friendly terms.

State and Church. Nearly 80 per cent of the people are Catholic. The differences between the State and Church caused serious disturbances. In 1905 the Separation Act provided for complete separation of Church and State. It guaranteed liberty of conscience and freedom of public worship.

World War. France suffered terribly in the World War of 1914, a large part of northeastern France was devastated. Her cities and towns were burned; her mines and industries wrecked, her fruitful fields made a desert. She regained, however, her former provinces of Alsace-Lorraine rich in iron deposits which will soon make her a great manufacturing nation.

ITALY

The Kingdom of Italy—Continued

Rome Joined to the Kingdom. In 1870 the French troops were withdrawn from Rome, which became the capital of United Italy.

Italy and the Church. In 1871 Parliament passed a bill which provided for the separation of the Church and the State, guaranteed the spiritual independence of the pontiff and allowed him $600,000 a year, which, however, has never been claimed.

Death of Victor Emmanuel and Pius IX. In 1878 Victor Emmanuel, the heroic figure in the struggle for nationalism, died. In the same year Pius IX also passed away. The Pope's kindliness of heart and his love for the people made him popular with the masses and his death was mourned by all.

Franchise Reform. In 1881 suffrage was extended to all men able to read and write.

The Triple Alliance. In 1882 Italy entered into an alliance with Germany and Austria.

The Finances. The financial condition of Italy after 1860 was deplorable. Though the ministers exercised "economy to the bone" they were finally compelled to resort to the obnoxious "grist tax," a tax on grinding wheat. In 1876 the revenues of the government for the first time equaled the expenditures and there was no deficit. By 1884, due to the removal of the grist tax combined with increased governmental expenditures for railroad construction and public works, the annual deficit again set in. By 1900 the public debt had reached the enormous sum of $2,500,000,000.

World War. As a result of the World War "Italia Irredentia" or the former provinces of Italy under Austrian rule,—Italian Tyrol, the area around Triest and portions of the East Adriatic coast became a part of Italy.

GERMANY

The German Empire

Franco-German War. The rivalry between France and Germany culminated in the war of 1870. Napoleon was doubtless influenced by dynastic considerations, but the war was exceedingly welcome to Prussia, in fact, it might have been averted, had not Bismarck deliberately altered the sense of a friendly telegram from King William to the French Ambassador so as to give offense to France, knowing this would lead to war, a result he ardently desired.

The result was a great defeat for France. In addition to paying a huge indemnity, the Rhine provinces of Alsace and Lorraine were wrested from her. The enthusiastic heat of this great victory welded i to one compact empire the various Germanic states and King William of Prussia became Emperor William I of Germany.

Period of the Empire. No nation ever made more rapid progress in the elements of national greatness than that experienced in Germany during the period of the empire, especially during the thirty years' reign of William II (1888-1918). It was the Golden Age of German industrial life. The Empire became a great manufacturing nation. Her foreign trade increased four fold. She became a great colonial power. She was second in rank among the naval powers of the world, and her army was the most powerful military machine ever organized.

The Republic. But the principles of government on which the empire rested were those of medieval times, not in tune with present day ideals, and the government was essentially autocratic in form. It became a glaring example of a nation in which militarism was the ideal of the leaders. The military caste and the ruling house began to dream of world dominion and the virus of this poison speedily infected the fountains of national life. The result was the World War, the downfall of the empire, and the rise of a republic in its stead.

AUSTRIA-HUNGARY

Enfeebled by the Seven Weeks' War, Austria was compelled to grant complete autonomy to Hungary.

Austria-Hungary was often called the polyglot nation because by the political development of previous centuries the original Austria and Hungary had extended their sway over the territory of neighboring Slavonic people and held them in an unwilling union. The ruling people in Austria, the Germans, made every effort to Germanize such of these people as formed a part of Austria. They endeavored to make them Austrian in language, culture and national ideals, and for this purpose enacted many oppressive laws. The ruling class in Hungary, the Magyars, were not behind Austria in this respect.

Thus the Dual Empire was structurally weak. It was in unstable equilibrium. The World War was the rock against which this unwieldy ship of state dashed and the Dual Empire went to pieces. Hungary resumed its independence; while the subject Slavic people severed the political ties that bound them to Austria on the one hand, and Hungary on the other. Instead of the Dual Empire of earlier years we have now a group of independent nations of which Austria and Hungary are minor representatives. The former subject people of the Dual Empire, with the territory they inhabited are divided among Poland, Czecho-Slovakia, Roumania, Jugo-Slavia, and Italy.

RUSSIA

Pan Slavism. The activities of Russia in Europe during recent decades were due to the strength of the Pan-Slavic movement, that is to say, the feeling of racial unity among all the Slavic people of Central and Southeastern Europe with which of course Russia sympathized and which impelled her to come to the assistance of other Slavic people. This feeling was at the bottom of the Russo-Turkish war of 1877-8, which resulted in the Slavic nations of Roumania and Bulgaria gaining their independence from Turkish misrule, and increase of Russian dominion in Asia. Finally it was the strength of this movement that impelled Russia to enter the World War of 1914 as an ally of Serbia.

The Russian Revolution. The one great outstanding fact in Russian history during recent years is the bloody triumph of the Revolutionary movement which like a smouldering fire had at uncertain intervals blazed forth, then thought to be extinguished, but in secret burned on until the political and social fabric of government fe' in ruins in the spring of 1917. It was a phase of development assuming a bloody form in Russia, as it had in France, but which in one form or another every European people known to history passed through, since it was an inevitable accompaniment of the evolution from tribal to political government, a change never fully made in Russia. Advantage was taken of the deplorable conditions in Russia resulting from the World War to bring to a conclusion the revolutionary movement. The Czar was deposed March 17, 1917, and the most revolutionary form of government ever known came into power, a process attended with some disintegration of territory in European Russia, resulting in the independence of Finland and the organization of border states from the Gulf of Finland south.

WORLD WAR

The World War of 1914 in which the majority of the nations of Europe were actively engaged was one of those great events in history, the full importance of which only the future will disclose. It was not only the greatest of all wars, but the political changes it effected, the far deeper and more significant social changes it seems destined to effect and which may extend to the warp and woof of organized society, render it the most important of all wars. It was an epoch-making war, but few, the equals of which, are known in history. From it we shall date a new age in the culture history of Europe, of the entire world.

Changes in European Governments. When the war began 63 per cent of Europe was included in the governments of three autocratic nations, at the heads of which were three ruling houses which for the thousand years preceding had swayed the destinies of Europe, each feeling that it was Divinely commissioned to rule, each secretly despising whatever constitutional limits had been placed on its personal rule. These three nations were Russia, Germany and Austria-Hungary; the ruling houses of which were (respectively) the Romanoff, the Hohenzollern and the Hapsburg.

When the war ended, these empires had passed away, in their stead were a number of nations of uncertain government,—Germany, Poland, Czecho-Slovakia, Austria, and Hungary. Jugo-Slavia is a country, the government of which is hard to define since it is a confederation

THE HISTORY OF SOME SMALL STATES SINCE 1815

Sweden and Norway

Sweden and Norway a Dual Monarchy in 1814. In 1814 the Diet of Eidvold adopted a constitution and elected a king. But Norway had been taken from Denmark by the Congress of Vienna and given to Sweden because Denmark had aided Napoleon, and Sweden resolved to enforce her claims. A compromise, however, was agreed upon by Norway and Sweden. Sweden recognized the new and liberal constitution of Norway on condition that the Norwegian Diet would ask for the abdication of the King of Norway, and elect, in his place, the Swedish king, who was to rule jointly over Sweden and Norway. The dual monarchy constituted a loose union, for Norway kept its constitution and its legislature, the Storthing.

In 1884 the Storthing, backed by a unanimous vote of the people, demanded of King Oscar of Sweden the right to regulate all internal affairs of Norway and to appoint separate consuls. The aristocracy of Sweden opposed these demands.

Independence of Norway. Manhood suffrage had been introduced in Norway in 1898 and soon after a political party sprang up urging complete separation of their country from Sweden. In 1905 the Storthing passed an act dissolving the union and providing for an independent provisional government. Both countries now prepared for war. But King Oscar was determined that the two Scandinavian peoples should not go to war. and so, when by a referendum vote the Norwegians declared unanimously in favor of independence, he urged a peaceful separation. In 1906 the people of Norway chose as their king, Charles, a Danish prince, who assumed the name Haakon. In October, 1906, the coronation of Haakon VII and Queen Maud, a daughter of Edward VII of England, took place. Norway was the first country of Europe that gave women the right to vote for members of Parliament.

Holland and Belgium

Belgium. The Congress of Vienna joined Belgium to Holland. In 1830 Belgium, with the assistance of France and England, gained its independence. In 1893 a suffrage act was passed giving to each man from one to three votes, the number depending on his age, wealth and whether he is at the head of a family. The public schools are under the control of the Church. As in England, the ministers constitute the government, and the king can act only through his ministers. In 1908 the Congo Free State in Africa, which King Leopold had by will bequeathed to Belgium, was formally annexed by Belgium, and a new colonial law was passed intended to remedy the deplorable conditions in regard to the government of the African state.

Holland. About two-thirds of the people of Holland are Protestants, the rest are Catholics. In 1896 a suffrage law gave the right to vote to all Dutchmen over 25 years of age who paid a small direct tax. It is virtually manhood suffrage. The country is in a prosperous condition.

Spain and Portugal

Spain. Isabella II became queen in 1843. Her reign was characterized by many court scandals in which the Queen was involved. After the revolution of 1868 Isabella fled to France, and the crown was offered to several princes. At last a son of Victor Emmanuel accepted the crown and tried honestly to improve conditions. In 1873 he voluntarily resigned.

After the resignation of the King a republic was established with Castelar as president, but the Spanish people could not appreciate republican institutions. Anarchy and crime became so common that Castelar felt obliged to proclaim himself dictator during a recess of the

of a number of essentially republican states under the hegemony of Serbia, itself a constitutional kingdom. Russia is still harder to define since it is an experiment,—the only one ever known—of a Soviet republic. A confederacy of a number of republican states may succeed it; or possibly several of these potential republics may be entirely independent new comers among the nations of the world.

But autocracy has definitely passed away. The dynasty of the Romanoffs has ended in blood, the head of the House of Hohenzollern, and that of the Hapsburg are in exile. It does not seem possible that scions of these ancient houses will ever again be called to rule in Europe, but if they do they will be strictly constitutional rulers. At present there is not a grand duke, or duke or prince exercising authority in the former territory of these nations. Luxemburg is the only duchy that has survived the storm.

Possible social and economic changes, affecting every strata of society, possibly organized government as well, loom portentously on the horizon of Europe, of our own country, of the civilized world,—as a result of this war. But all should wait with confidence the future knowing that evolution does not go backward and that out of seeming ills will come forth good. We should see in the great unrest in Europe—in the world, the birth pangs of a new age.

THE HISTORY OF SOME SMALL STATES SINCE 1815

Cortes. He used the army in checking lawlessness and disorder. When the Cortes reassembled, Castelar, disgusted with his office, promptly resigned.

In 1874 Spain offered the crown to Alfonso XII, the son of Isabella II, and monarchy was again introduced. In 1876 Spain secured her first real constitution. Under Alfonso local self-government was granted the people and many reforms were introduced.

The Cuban Question. The Cuban colonists revolted again and again. Finally Spain sent General Weyler to restore order. He was merciless in stamping out the rebellion. In 1898 the United States interfered in behalf of downtrodden Cuba and declared war against Spain. The Spanish fleet in Manila Bay was destroyed by Admiral Dewey, and another fleet under Cervera which had been sent to Cuba from Spain was utterly destroyed by admirals Sampson and Schley at Santiago. Peace was then made. Spain declared Cuba free and ceded the Philippine Islands to the United States upon the payment of $20,000,000.

In 1902 Alfonso XIII, son of Alfonso XII, was crowned king. Spain is now devoting her energies in developing the resources of the land and in educating her people.

Portugal. In 1807 the French seized Portugal and the King fled to Brazil, the greatest of the possessions of Portugal. England then came to the assistance of Portugal and the French were driven from the country.

In 1901 manhood suffrage, with slight restrictions, was introduced, and the veto power of the sovereign greatly reduced. King Carlos was a spendthrift and it was charged that he was guilty of complicity in financial scandals. In February, 1908, he and the Crown Prince were assassinated. Prince Manuel then ascended the throne as Manuel II, but in 1910 during an uprising against the government he fled to England. A republic was then proclaimed.

Switzerland

In 1815 the Swiss cantons were joined in a loose confederation. By the constitution of 1848 a federal government was organized with centralized power and Switzerland became a nation. Since 1848 all amendments to the constitution must be submitted to popular vote, and since 1874 all federal laws upon the petition of 30,000 voters must be submitted to popular vote. In 1891 the initiative was introduced, according to which any 50,000 citizens can frame a law which the Federal Congress must then submit to the people. Thus the Swiss established the principle of direct legislation. Switzerland has no illiterates. The people are very prosperous.

The Balkan States

In 1815 southeastern Europe was a part of the Turkish Empire. In 1828 Greece gained its independence. After many revolts of the Slavonic nations, most of which Turkey put down with incredible ferocity, Servia, Bulgaria, Roumania and Montenegro, with the aid of Russia, became independent. In 1912 Bulgaria, Servia, Greece and Montenegro began a war to complete the emancipation of their Christian brethren and to drive the Turk out of Europe. The allies defeated the Turkish armies and were ready to attack Constantinople when the western European powers intervened. An armistice resulted in failure. The war was renewed, and by 1913 the Turks were totally defeated. During the World War Turkey and Bulgaria, choosing to aid Germany, were defeated and lost much of their territory.

Hitch'cock, Edward (1793-1864), an American geologist, born in Massachusetts. He was chosen professor of chemistry and natural history in Amherst College, where he afterwards became president, with the chair of natural theology and geology. One of the foremost geologists of the United States, Hitchcock was first president of the American Geological Society, which originated from his suggestion. He wrote *Geology of Massachusetts, Religion of Geology and its Connected Sciences, Religious Truth, Illustrated from Science* and *Religious Lectures on Peculiar Phenomena of the Four Seasons.*

Hitchcock, Ethan Allen (1835-1909), an American statesman, born in Mobile, Ala. He was appointed minister to Russia in 1897, and the next year was made secretary of the interior. During his term of office Hitchcock won national fame by his fearless exposure of the frauds connected with securing public lands and his successful prosecution of the leading perpetrators of these frauds, some of whom were public officials of high standing. He resigned in 1907 and died two years later.

Hitchcock, Frank Harris (1867-), an American lawyer and statesman, born at Amherst, Ohio, and educated at Harvard and George Washington universities. He was admitted to the bar of the District of Columbia in 1894 and admitted to practice in the United States Supreme Court in 1897. He has held many important public posts, among which are chief of the division of foreign markets, chief clerk in the department of commerce and labor, assistant postmaster-general, and postmaster-general in Taft's cabinet from 1909 to 1913. During his administration as postmaster-general, postal savings banks and the parcel-post service were instituted.

Hit'tites, the name applied to a group of nations of Old Testament history, and also found in Egyptian and Assyrian inscriptions. The Hittites of the Old Testament seem to be divided into three groups: the children of Heth, from whom Abraham purchased a burying place (*Gen. xxiii*); the Hittites who inhabited Palestine previous to its occupation by the Israelites; and those who dwelt in northeastern Syria, and with whom Solomon formed marriage alliances. The third group were united in some sort of an empire, and figure more prominently in Egyptian and Assyrian than in Bible records. Hieroglyphic inscriptions recount their vigorous resistance to several Egyptian monarchs, while cuneiform inscriptions mention a people called Hatti, who were in frequent conflict with the Assyrians from the time of Tiglath-Pileser I to that of Sargon II (about 1100 B. C.-721 B. C.). Many Hittite monuments and inscriptions have been found in Syria, at Carchemish, Hamath and neighboring places; and throughout Asia Minor.

Hives, or **Nettle Rash,** a disease which appears as an eruption on the skin, usually in patches. It occurs first in the form of small, white, rounded elevations accompanied by an itching sensation. Scratching acts as an irritant, causing the parts affected to turn red. The disturbance may be brought on by contact with stinging nettles or by indigestion caused by eating fresh pork, fish or certain fruits. Inflammation may be reduced by a solution of baking soda applied locally.

Hoangho, *Hwahng' ho',* or **Hwangho,** a river in China, next to the Yangtsekiang the largest in the country. It rises in a marshy plain in Tibet and flows eastward in an unusually winding course, crosses the Great Wall into Mongolia, continues east to the western boundary of Shansi, a Chinese province, then south, and, after winding eastward once more, empties into the Gulf of Pechili. The course undergoes frequent changes, and inundations occur continually as a result of the large amount of sediment which it carries. Because of the disasters caused by this overflowing, it has been called "China's sorrow." Its total length is over 2500 m. The principal tributaries are the Taoho, the Tatungho and the Weiho.

Hoar, George Frisbie (1826-1904), an American statesman, born in Concord, Mass. He graduated at Harvard in 1846, was admitted to the bar and began practice at Worcester, Mass. In 1852 he became a member of the State Legislature, served in the lower branch of Congress from 1869 to 1877, and in the Senate from the latter year until his death. He served on the electoral commission in 1877, and on many important committees in Congress, and exercised great influence over national legislation.

Ho'bart, the capital of Tasmania, situated on the Derwent River, at the foot of the lofty Mt. Wellington. The prominent buildings include the St. Mary's Roman Catholic Cathedral, the Baptist Tabernacle, the Government House, the House of Parliament, the University of Tasmania, the town hall, the national art gallery and the museum. It is a regular port of call for Australian lines and has a large export and import trade. Fruit is exported to Sydney and London. Other products include grain, hops, timber and wool. Among important industries are saw and flour milling, brewing, tanning, iron founding and the manufacture of soap, hats, barrels, pottery and woolen goods. Hobart has long been a favorite summer resort. Population in 1901, including the suburbs, 34,182.

Hobbema, *Hob' e mah,* **Meindert** (1638-1709), a Dutch landscape painter of unknown origin. His subjects are quiet and restful, being secluded woodlands, peaceful waysides, streams and water mills. His pictures are flooded with golden light; the atmosphere is transparent, the color warm, the space infinite; his trees are of special charm, of great variety and individuality. The largest and best collection of his works is in the National Gallery, London, which contains the well-known *Avenue Near Middelharnis, Holland.* Famous also are *Ruins of Breberode Castle* and *Landscape View in Holland,* the latter in the Metropolitan Museum of Art, New York.

Hobbes, *Hobz,* **Thomas** (1588-1679), an English philosopher, one of the first great English writers on government. His most remarkable work, *Leviathan,* was published in 1651, and it advocated pure and unrestrained monarchy as the best form of government. Hobbes contended that such a government was a contract between the sovereign and the people, who were moved by the desire to escape from all the evils of a state of nature, which is a state of war. This has probably given more offense than any other political theory ever propounded.

Hobkirk's Hill, Battle of. See CAMDEN, BATTLES OF.

Ho'boken, N. J., a city of Hudson Co., opposite New York City, directly north and east of Jersey City on the west bank of the Hudson River, and the eastern terminus of the West Shore, the Delaware, Lackawanna & Western and other railroads. Hoboken is connected with New York by steam ferries and by two subway lines through tunnels under the river. Electric railways also connect with the towns and cities of northeastern New Jersey. The principal streets of the city run nearly parallel with the river, and its miles of water front give excellent shipping facilities. The piers of the North German Lloyd, the Hamburg-American, the Holland-American and the Scandinavian steamship lines are located here. The city, which covers an area of about one square mile, lies at the base of the Palisades, which rise on the north and west to a height of 200 ft.

PARKS, BOULEVARDS AND BUILDINGS. Hoboken contains 26 m. of well-paved streets and boulevards. Castle Point in the northeast rises from the generally low level to about 100 ft. Hudson Park contains a soldiers' monument; and Church Square Park, a firemen's monument. Palisades Park was laid out in 1911 and will ultimately reach along the west bank of the Hudson River for 50 m. Among the public buildings are the Delaware, Lackawanna & Western Railroad Station, city hall, Federal

Building, banks, substantial business blocks and many fine church edifices.

Institutions. The educational institutions include the Stevens Institute of Technology, the high school, Hoboken Academy, Sacred Heart Academy, a public library and nine public schools. St. Mary's Hospital is a well-equipped institution.

Industries. Hoboken has an extensive trade in every known commodity, especially in coal, and is one of the principal points from which New York and its shipping are supplied. The city is an important industrial center and contains automobile works, foundries and machine shops, silk mills, wall-paper mills, chemical works, lumber mills and manufactories of lead pencils, leather goods and caskets. There are also large yards for shipbuilding and repairing.

History. The land upon which Hoboken is located once formed a part of the territory of New Netherland. The place was early known as Hopoghan Hackingh, "the land of the tobacco pipe." In 1711 title was acquired to the place by Samuel Bayard, Jr., a New York merchant. During the Revolutionary War his descendant, William Bayard, was a Loyalist, and his home was burned and estate confiscated. Col. John Stevens purchased the property in 1784 and in 1804 laid it out as a town. Hoboken was incorporated as a town in 1849 and as a city in 1855. Population in 1920, U. S. Census, 68,166.

Hock'ey, a game imperfectly organized except in England, its original home, and there played under definite rules only since 1883. In the United States it is commonly called shinny. It requires a space perhaps 200 ft. wide and 300 or 400 ft. long; and is commonly played by any number of persons, divided into approximately equal teams. A single small ball is laid down in the center of the field. Two players, one from each side, stand facing each other with their shinny sticks against opposite sides of the ball. At a given signal each raises his stick and endeavors to hit the ball so as to drive it toward his opponent's goal line, all other players of each team having already formed in long lines of defense. As soon as the ball is in play, the teams scatter over the field and a rough and tumble contest ensues, which continues until the ball is driven over one or the other of the goal lines. Wherever and whenever there is good skating, ice hockey is now almost certain to be in vogue. The Hockey Association of Canada organized this game under definite rules about 1887; and it has since become a favorite winter sport for many college and local associations both in the United States and Canada, and intercollegiate contests are a feature of the winter season.

Hodg'ins, John George (1821-), a Canadian author and public official, born in Dublin, Ireland, and educated at Victoria and Toronto universities. He served successively as chief clerk of the department of education, Upper Canada, secretary of the provincial board of education, Ontario, deputy superintendent of education, deputy minister of education and librarian and historiographer, all of Ontario. In 1904 he became historiographer alone. He edited the *Upper Canadian Journal of Education* for 30 years and is a pioneer in school-book literature in Canada.

Hoe, Richard March (1812-1886), an American inventor and manufacturer, born in New York City. He worked with his father in the manufacture of printing materials and in 1832 succeeded to the management of the business. In 1837 a trip to England afforded him opportunity of observing advanced presses and enabled him to make great improvements in printing machines. Nine years later, in 1846, he patented the rotary printing press. With his brothers, Robert and Peter, he continued to manufacture presses for many years, meanwhile, with their aid, inventing the web-perfecting press, now generally used in the printing of newspapers. See Newspaper; Printing Press.

Ho'fer, Andreas (1767-1810), a patriotic leader of the Tyrolese. When 29

he led a body of his countrymen against the French, and in 1809 headed an insurrection which temporarily liberated his country from the yoke of Napoleon. He acted as head of the government until deserted by the Austrians, when the French made a third invasion and the Tyrol was conquered. Hofer was betrayed to the enemy, was condemned by Napoleon and shot.

Hof'mann, Josef (1877-), a Polish pianist, born at Cracow. His father was director of the Warsaw Opera and a professor in the Warsaw Conservatory, and the son was early given musical training. In his sixth year he began appearing in public at recitals and was immediately famous. After studying for two years under Rubenstein, Hofmann reappeared in public in 1894 and has since delighted audiences in all countries. His visits to the United States have been enthusiastically heralded and most favorably received. Hofmann has composed many selections for the piano and a well-known concerto in B flat.

Hog, the representative species of the Swine Family, and known, through domestication, in all but the coldest climates. The many breeds which are raised upon the great stock farms of the United States are all descendants of the wild hog, or boar, and retain many of the characteristics of the original species. Like them they have large and rounding heads, with long, flexible snouts of soft cartilage, which end in a flattened disk, bearing the nostrils; with this snout whole fields may be plowed up as the animals search for truffles, roots and buried nuts. The eyes and ears of the hog are small, the body broad but often long, the legs short and completed by four toes, upon the middle two of which the animal walks. The tail is short and thin and in many species is tightly curled. The color of the hog is creamy yellow, black or black-spotted; in wild hogs the young, called pigs, have tawny spots which disappear as the animal grows older.

The occupation of hog raising is an important branch of agriculture in the United States; the flesh of the hog is of excellent flavor and, since it takes salt readily, is one of the best packed meats. The fat of the hog is manufactured into lard, the bristles into brushes, and the skin is of use in bookbinding. See MEAT PACKING.

Contrary to common belief, hogs are intelligent animals, and are occasionally trained for performances in the circus ring. In European countries they are used to locate truffles, which are completely buried underground, and in some instances, to point game, a sport in which some varieties are adept. See TRUFFLE.

Ho'garth, William (1697-1764), the great English painter, was born in London, the son of a schoolmaster. He began his artistic training as an apprentice to a silver-plate engraver. Later he opened a shop of his own, where he engraved coats of arms, bookplates and other illustrations. The works of Hogarth are clever satires on society and caricatures of prominent personages of his day, and he executed with a brush what Dickens and Thackeray depicted with a pen. Hogarth was the earliest, most original and one of the greatest of the entire British School of Painting. The most characteristic of his works are *The Enraged Musician, The Distressed Poet* and *Marriage à la Mode.*

Hogg, James Stephens (1851-1906), an American lawyer, born near Rusk, Tex. His first public office was that of justice of the peace in Wood County, and he advanced through the successive offices of county attorney (1878-1880), district attorney (1880-1886) and attorney-general (1886-1890) to that of governor of the state (1890-1895). After retiring from public office he continued the practice of law, and was in demand as a popular speaker until the time of his death.

Hohenstaufen, *Ho" en shtou' fen,* a German dynasty, which ruled the empire from 1138 to 1254. The family derived its name from a castle, the ruins of which may still be seen on the left bank of the Danube, a few miles below

Stuttgart. The first of the house to come to the throne of Germany was Conrad III, and the succeeding emperors were Frederick I, who was known as Barbarossa, Henry VI, Philip I, Frederick II and Conrad IV.

Hohenzollern, *Ho" en tsol'ern,* the name of a dynastic House in Europe. Its origin was not unlike that of the other great house in German history, the House of Hapsburg. They originated in the same way—petty chieftains—in the same section of Europe, only about one hundred miles separated them. But the House of Hapsburg had long been a leading figure in German history before the House of Hohenzollern became at all prominent. It was a Hapsburg who created a Hohenzollern Margrave of Brandenburg in 1411. The consideration was a sordid one,—the emperor pawned the margravate as security for a loan. See PRUSSIA.

Hokusai, *Ho' koo sah" e,* (1760-1849), a Japanese artist, the son of a maker of metal mirrors in Honjō. His life was full of adventure, beginning when he left home at the age of 13 to apprentice himself as an engraver. He worked at his trade for five years and then became a pupil of a famous designer, who soon expelled him from his school for his persistence in ignoring the standards of art of the day. Hokusai was by turns a peddler, illustrator and teacher. In the latter profession, which he adopted in 1810, he was immediately successful, and the number of his pupils became so great that he was forced to learn wood engraving to keep them supplied with models. From this arose his album entitled *Ten Thousand Sketches* and his *A Hundred Views of Fujisan.*

Holbein, *Hole' bine,* **Hans,** the Elder (about 1460-1524), a German painter, born at Augsburg of a family of painters. The work of his earlier years is of the Flemish School and is less pleasing than his later pictures, which show the influence of Italian art. Holbein's earlier portraits, although in ready demand, are now less valued, but his drawings show a pleasing lightness of touch and delicacy of execution that is also marked in the work of his son. Influenced by Italian art, Holbein's later pictures have less artificiality, more attention to anatomy and a more pleasing display of color, drapery and form. The last years of the artist's life were marked with financial difficulties. Holbein's best-known pictures are: those in the Cathedral at Augsburg, portraying scenes from the life of the Virgin; scenes from the Passion in the Dominican Church at Frankfort-on-the-Main; the *Fount of Life,* now in the gallery at Lisbon; *St. Sebastian* and *St. Katharine* in the gallery at Augsburg; and scenes from the Passion, in the Munich Gallery.

Holbein, Hans, the Younger (about 1497-1543), a German painter, the son of Hans Holbein mentioned above. His earliest training was received at the hands of his father, but when 18 years of age he went to Basel, where he worked illustrating books. Here he also began painting portraits, and his work became sufficiently well known to cause him to be called to Lucerne for two years' work in designing and decorating. After his return to Basel, where he remained until 1526, he painted many notable pictures. From 1526 to 1528 he was in England at the court of Henry VIII, and there painted portraits of many distinguished persons. With the exception of four years, 1528 to 1532, spent in Basel, Holbein passed the remainder of his life in England, where he became one of the foremost of the world's portrait painters. Aside from portraits, his *Dance of Death* and *The Ambassadors* are his most celebrated works. Among his portraits are those of Henry VIII, Anne of Cleves, Erasmus, Thomas More, Lady Jane Seymour and the Duke of Norfolk. Holbein was also a master of wood engraving and was among the first to paint portraits in miniature.

Holden, *Hole' den,* **Edward Singleton** 1846-1914), an American astronomer, born in St. Louis, Mo., and educated at Washington University and the United States Military Academy, where from

1873 to 1881 he was professor of mathematics. For the next four years he was director of the Washburn Observatory at Madison, Wis. Later he became president of the University of California and director of the Lick Observatory. Among his works are *Index Catalogue of Nebulæ, Writings of Sir William Herschel, Earth and Sky* and *Essays in Astronomy.*

Holiday, originally, holy day. This is a day set apart as an anniversary of some religious event, or for commemorating some national or state event of great importance. Religious holidays are fixed by the Church and differ among different denominations, though all Christian denominations are practically uniform in celebrating Christmas and Easter. In the United States legal holidays are fixed by Congress if national, and by the Legislatures of the different states if local. The national holidays in the United States are Labor Day, Thanksgiving, Christmas, New Year's and Fourth of July. On legal holidays banks are closed because they cannot legally transact business with negotiable paper.

Hol'land, Josiah Gilbert (1819-1881), an American editor and author, born in Belchertown, Mass. He studied medicine at the Berkshire Medical College, but his first years of practice at Springfield, Mass., were not successful. After teaching school for a short time he was assistant editor of the Springfield *Republican.* In 1870 he was one of the founders of *Scribner's Monthly* and became its editor, remaining in that position when it was changed to the *Century* and until his death. His early writings were published under the name of Timothy Titcomb. He wrote moral verse, faithful descriptions of picturesque village life in New York, novels, essays, history and biography. His works include: the novels, *Miss Gilbert's Career* and *Arthur Bonnicastle;* the poems, *Bittersweet, Kathrina* and *Garnered Sheaves;* and *Letters to Young People, Plain Talk on Familiar Subjects* and *Life of Lincoln.*

Holland, Mich., a city of Ottawa Co., 26 m. s. w. of Grand Rapids and 80 m. w. of Lansing, at the head of Black Lake, an arm of Lake Michigan, and on the Pere Marquette and other railroads. Holland has a good harbor, direct communication by steamship with Chicago, Milwaukee and other ports, and is an important trading and manufacturing center. The industries include the manufacture of furniture, beet sugar, woodworking machinery, tubs, baskets, flour, pickles, electric and steam launches and veneer; there are also tanneries, planing mills, creameries and grain elevators. Holland is the seat of Hope College, and of the Western Theological Seminary, both controlled by the Reformed Church of America. It has several fine buildings and a public library. The city was settled in 1847 by a Dutch colony. It was chartered as a city in 1867. Population in 1920, 12,183.

Hol'ly, a tree or shrub of the Holly Family, having thick, stiff leaves whose broad, concave scallops are separated by sharp, rigid points. These leaves, though not always evergreen, generally retain their shining bright color throughout the winter. The flowers appear early in the summer and may be single or in clusters but are always white in color. The fruit is a bright red berry containing from two to six one-seeded nuts. The European holly is one of the most ornamental of European shrubs; the American species has duller leaves and less brilliant berries, but is also very decorative. It grows from southern New England south and is common in Tennessee and Arkansas.

On account of the great contrast of the evergreen leaves and red berries in the winter, the holly is sacred to winter festivities and is the symbol of the Christmas season. Its leaves are the emblem of forethought because of the protection given to the buds by the defensive thorns.

Hol'lyhock, a tall garden plant of the Mallow Family, brought from Syria. The leaves are rough and deeply-veined and have five or seven lobes. The flow-

ers are attached by short stems to a tall spike upon which the lower buds open first. They are three to five inches broad and of all shades of red, yellow, blue and white; their time of blooming is the late summer and autumn. Hollyhocks are favorite old-fashioned flowers and are cultivated in gardens in single or double varieties.

Holmes, *Homez,* **Oliver Wendell** (1809-1894), an American poet, essayist and physician, born at Cambridge, Mass. The year 1809 was lavish in its gifts, bestowing on the world not only Holmes, but Gladstone, Tennyson, Darwin and Abraham Lincoln. In later years Holmes spoke with pride of his lineage. Abiel Holmes, his father, a Calvinist minister, graduate of Yale and author of a history, was descended from one of the early inhabitants of Woodstock, Conn. Through his mother, Sarah Wendell, he could trace his descent from Anne Bradstreet and his relationship to the orator Wendell Phillips, the poet Richard Henry Dana and the clergyman Dr. Channing. His father had hopes of educating young Oliver for the ministry, but the stern theology preached by the orthodox Abiel Holmes and his friends was far from attractive to the lively fun-loving boy, who wrote in after years that some of his father's clerical visitors, with their sad looks and woebegone ways, did more to unchristianize him than their sermons were apt to accomplish in the other direction. Of his early schooling it is recorded that he behaved himself and made good progress. At the age of 15 he was sent to Phillips Academy at Andover, and in the following year, 1825, entered Harvard College. The famous "class of '29," of which he was a member, bore on its roll the names of several illustrious men, and has received further renown by the lyrics Holmes wrote for the anniversary dinners held in after years.

Physician and Teacher. On leaving college Holmes studied law for a year. During this time he wrote his first successful poem, *Old Ironsides,* which was inspired by the order for the destruction of the historic, old war frigate, the *Constitution.* The stirring lines of this poem created such an outburst of national indignation that the old boat was saved, and may be seen today in the Charlestown navy yard. Regarding the law as merely an experiment, Holmes next took up the study of medicine at a private school. The need of more thorough instruction induced his parents to send him to Paris in 1833 to study under the famous French physicians and surgeons. While in France he worked with praiseworthy diligence, beginning his practice in Boston in 1835. Holmes's brilliant social qualities proved a hindrance to his success as a physician, as the Bostonians seemed to feel that so witty a doctor was not a trustworthy person to care for their bodies. His prospects were brightened, however, by prizes awarded him for professional papers and his appointment as professor of anatomy at Dartmouth College in 1838, a position which he held for two years.

In 1840 he married Miss Amelia Lee Jackson, a lady of charming character. Their eldest son, Oliver Wendell Holmes, Jr., was in 1902 appointed an associate justice of the United States Supreme Court. In 1847 Dr. Holmes became professor of anatomy and physiology at the Harvard University Medical School, where his duties were so varied that he made the statement that he occupied "not a chair, but a settee in the school." His lectures were so witty and stimulating that the last period of the day was allotted to him, a tribute to his ability to keep the students awake after a series of difficult lectures. He held his Harvard position for 35 years, a source of great pleasure and pride to him.

Literary Achievement. Several volumes of verse, published in 1836, 1846, 1849 and 1850, gave Holmes a reputation as a poet, but he did not produce the works by which he is best known until 1857, the year of the founding of the famous *Atlantic Monthly.* Through the influence of his good friend James Russell Lowell, Holmes was invited to contribute to this magazine, and its first

number contained the opening paper of *The Autocrat of the Breakfast Table* series. The success of these original and witty essays was so decisive that their author was launched on a new career immediately. On the conclusion of the *Autocrat* series the *Professor* took the chair at the breakfast table (1859). In these essays Holmes wrote as he talked at the Saturday Club dinners, where he was admitted to be the most entertaining among a group of such charming talkers as Emerson, Longfellow, Whittier, Lowell, Sumner, Agassiz and Motley. A third series of essays, *The Poet at the Breakfast Table,* appeared in 1872.

Holmes wrote poetry from time to time throughout his literary career, being unusually gifted as the poet of special occasions. While much of his verse was of merely temporary interest, he wrote a few poems of enduring value, among them *The Chambered Nautilus, The Living Temple, The Voiceless, The Last Leaf* and *The Iron Gate.* Such poems as *The One Hoss Shay* and *Parson Turell's Legacy* take high rank as examples of humorous verse. In 1861 he wrote his first and best novel, *Elsie Venner,* followed in 1867 by *The Guardian Angel,* and in 1885 appeared a third, *A Mortal Antipathy.* All of these novels are studies in hereditary tendencies. This versatile and cheery author also attempted biography, producing in 1878 a life of his close friend, the historian Motley, and in 1884 a life of Emerson. In 1886 he made a trip to England, where he was received with great enthusiasm, becoming the recipient of honorary degrees from the universities of Cambridge, Oxford and Edinburgh. His last important work, *Over the Tea-Cups,* of the same character as the *Breakfast Table* papers, appeared in 1890, when he was 81 years of age.

Personal and Literary Qualities. The writings of Holmes express most clearly his genial and kindly nature. The wit and humor that brighten his essays and poems give his readers the same sort of entertainment that was enjoyed by those who listened to his brilliant conversation. Yet Holmes was more than an apostle of good cheer. He was always courageously outspoken against vice and superstition, and his serious lyrics reveal the depth of his feeling for the true and the beautiful in life. His achievements in poetry were less notable than those of Longfellow, Lowell or Whittier, but as the creator of a new type of prose Holmes must take high rank in the list of American men of letters.

Holmes, Oliver Wendell, Jr. (1841-), an American jurist, born at Boston, Mass. His father was the distinguished author of the same name. Judge Holmes studied at Harvard, graduating from the law school there. He served two years in the Civil War, then began the practice of law in Boston. While practicing law in Boston he edited the *American Law Review.* Judge Holmes accepted the chair of law in Harvard Law School in 1882, in which year he also became associate justice of the Massachusetts Supreme Court, being made chief justice 17 years later. He was appointed associate justice of the Supreme Court of the United States in 1902.

Holmgren Test for Color Blindness. See Color, Theory of.

Holy Alli'ance, a league between Alexander I of Russia, Francis II of Austria and Frederick William III of Prussia, formed in September, 1815. It declared that in accordance with the teachings of Jesus Christ the principles of justice, charity and peace should control the domestic policy and international relations of rulers, and that their great object would be the religious welfare and happiness of their subjects. However, the real object of the Alliance was to maintain the power of the rulers of Europe against the rising tide of democracy. Metternich, the Austrian minister, was its chief supporter. The design of the Alliance respecting Russian colonization in North America in 1823 was one of the causes for the promulgation of the Monroe Doctrine by the American Government.

Holy Family, in art, the name given to the group composed of the Virgin,

the Infant Jesus and accompanying figures. The earliest representation of such a group is in the Catacomb of St. Calixtus, Rome, representing the Virgin and Child and the Prophet Isaiah. The traditional arrangement was the seated Madonna, with the Child on her lap, both figures gazing out at the spectator, the Infant with hand upraised in an attitude of blessing. Variations of this composition were introduced later; the Virgin's seat became a throne; angels were grouped about; emblems of the Passion were added. Late in the Middle Ages, St. Anna, the mother of the Virgin, St. Catharine, St. Joseph and St. John, and sometimes the Twelve Apostles, found place in the group. The Madonna and the Child have been one of the favorite themes of modern artists. Giovanni Bellini, Filippo Lippi, Perugino, Raphael and Andrea del Sarto are among those who have treated the subject with greatest skill.

Holy Grail, The. See GRAIL, THE HOLY.

Holyoke, *Hole' yoke,* **Mass.,** a city of Hampden Co., 8 m. n. of Springfield and 75 m. s.w. of Boston, on the Connecticut River and on the New York, New Haven & Hartford, the Boston & Maine and other railroads. Interurban railways connect it with the near-by towns and cities. The city contains many fine public buildings, which include the College of Music, House of Providence Hospital, two orphanages—St. Vincent's for girls, and Holy Family for boys—and the Holyoke Scientific Society. Within easy reach of Holyoke are three of the most famous colleges of the country—Amherst, Mt. Holyoke and Smith.

Extensive water power is furnished by a dam across the Connecticut. For many years Holyoke has been noted for the number and magnitude of its paper mills, which earned for it the title of the "Paper City." The paper industry is one of the largest in the world. There are also extensive manufactories of cotton, silk and woolen goods, cutlery, machinery, files, writing paper, blank books, sash and blinds, tools, automobiles, bicycles, bits, thread, pumps, knit goods, belting, screws, bricks, furniture and school supplies.

Holyoke has many points of scenic interest, notably Mt. Tom and Mt. Holyoke, which are ascended by electric railways. There is also an extensive state reservation. Population in 1920, 60,203.

Holy Roman Empire. The Holy Roman Empire dates from the crowning of Charlemagne in 800 A. D. as the successor of the Roman emperors. When Otto the Great was crowned by the Pope in 962, the name *Roman* was used for the first time, and in 1152 Frederick Barbarossa used the term *Holy.* From his time the name *Holy Roman Empire* was used to designate all the lands under the control of the German sovereigns, and at different times the empire included Germany, Italy, Denmark, Hungary, Poland, Cyprus and Jerusalem. The Hohenstaufen line of emperors had some claim to imperial control, but for centuries the title was an empty name. In 1806 Francis II gave up the title of Holy Roman Emperor and the name became extinct. See GERMANY, subhead *History.*

Holyrood, the royal palace of the Scottish sovereigns. It was originally an abbey built by David I in 1128, on the spot where his life was saved by a miraculous rood or cross which came between him and a pursuing stag. It was rebuilt by Charles II between 1671 and 1679.

Homeopathy, *Ho" me op' a thy,* a system of medicine, opposed to allopathy and founded upon the belief that the chemical substance which causes a disease will cure it. The principles were first formulated by Dr. Samuel Hahnemann of Leipsic, and consisted in "testing" a drug by noting the symptoms shown by healthy persons taking it, then applying that drug to a diseased person showing the same symptoms. At first the system also included the treatment by a single, very large dose, but this Hahnemann soon changed, and advocated giving minimum doses and as often

as required. The system from the first has met strenuous opposition, but it has a large following in the United States, where there are at present about 15,000 homeopathic physicians and 18 colleges. See MEDICINE.

Ho'mer, the great epic poet of Greece. Because of the obscurity surrounding his name and existence, the word *Homer* has come to be applied to the whole of the early epic poetry of Greece, on the assumption that no single individual bearing that name ever existed. He is, however, generally recognized as the poet who shaped the *Iliad* and the *Odyssey,* the two great epics of Greek and world literature. According to Herodotus he lived about 850 B. C.; later authorities place him variously in the tenth and the eleventh centuries. There are eight extant lives of Homer, and these present widely divergent facts concerning his life. Some say his name is derived from the Greek word for *hostage,* and make him a hostage in youth; others, that his name is a dialectic word for *blind,* as he is said early to have lost his sight. He is thought to have wandered around from town to town in Asia Minor, earning his bread by reciting his poetry or by teaching. Or, he may have been a singer in a royal house of the Homeric age. The lines

"Seven cities claimed the mighty Homer dead,
Where living Homer begged his daily bread,"

have grown proverbial. Since there is no authentic external testimony to prove the time and place of Homer's life or of the writing of his verses, internal evidence from the poems can alone be resorted to, and even this yields only meager definite results.

He represents the first name in European literature. It is unknown whether or not the poems ascribed to him were written during his lifetime, though a few facts point weakly to the supposition that they were. The *Iliad* (See ILIAD) and the *Odyssey,* are masterly products of a mind given to thinking in concrete terms and possessing to an extraordinary degree the power of detailed and vivid description. There is nothing subjective about his work; his accounts are a faithful mirror of the external world. He presents detailed descriptions of the most ordinary events in the daily life of the Greek; hence we come to know through him more intimately the life of the Homeric man than that of any other primitive people. Matthew Arnold in an illuminating commentary on his style has once for all pointed out the four qualities that make for enduring recognition. He finds it (1) rapid; (2) plain and direct in the evolution of thought and in his expression of it; (3) plain and direct in the substance of his thought, that is, in matter and ideas; and (4) eminently noble. The nobility of his work rests on its very simplicity. The feelings he describes are primitive, and he never stops to analyze or refine. His interest is purely dramatic. Witness his *Odyssey,* wherein he describes, in 24 books, the extraordinary experiences of Odysseus after the ten years' siege of Troy, who was constrained to wander ten solitary years longer, patiently yearning to see the rocky Isle of Ithaca. The poet's interest here is in a broad and sweeping picture of human action and feeling, that may lack unity but never forceful directness or a marvelous power of picturing a multitude of things. He cares little for themes like political questions, race antipathies or matters of religion, but transcends them in his greater vision and nobler purport. His influence on contemporary and subsequent literature was extraordinary. To the Greeks he has been the Bible itself. Men began to copy his literary excellencies immediately, and parallelisms to his style and thought run through the centuries of literature that followed. Even today the great gods which he celebrated are known chiefly through the medium of his art, and as such continue to live in the poetry and sculpture that are products of our own age. Consult Jebb, *Introduction to Homer.*

Homer, Winslow (1836-1910), one of the leading artists in America at the beginning of the 20th century, born in Boston. After working in a lithographer's shop and contributing sketches to magazines, he entered the National Academy of Design as a pupil. In 1859 he removed to New York, and during the Civil War was artist and correspondent for *Harper's Weekly*. His first important picture, *Prisoners from the Front,* was exhibited in 1864. *The Maine Coast* is probably his masterpiece.

Home Rule, a measure which passed the British Parliament in 1914 providing for the government of Ireland. This bill was the result of nearly a half-century of agitation by the Irish to secure the right to legislate concerning affairs pertaining only to Ireland. The measure was first advocated by the Irish Nationalists in 1870. The first Irish home rule bill was introduced into the House of Commons by Gladstone in 1886 and was defeated. The second bill, also introduced by Gladstone in 1893, was passed by the House of Commons but defeated by the House of Lords.

In 1909 the Irish Nationalists and the Liberals formed an alliance, by which the former agreed to support the budget and other government measures on the understanding that a Home Rule bill was to be passed.

In 1911 Parliament passed an act enabling a bill to become a law without the consent of the House of Lords provided it passed the House of Commons three times and was signed by the King. The Home Rule bill passed in 1914 became a law by virtue of this bill, having been passed by the House of Commons three times and defeated successively in the House of Lords.

The measure grants and provides for an Irish Parliament consisting of a Senate of 40 members and a House of Commons of 164 members. The powers of this body are restricted to legislation pertaining to Ireland.

Strenuous opposition to Home Rule developed in Ulster because the residents of this province believed the measure to be unfavorable to their commercial and religious interests. For a time Civil War seemed imminent but Parliament made provision whereby each county might decide by vote whether or not it would come under the operation of the Home Rule act for the first six years after it went into force. Upon the breaking out of the European War, however, the operation of the bill was suspended for one year.

Home'stead, in law an estate in land, used as a home by the tenant or owner, and to a greater or less extent protected by law from the claims of creditors. This exemption right is a modern privilege created by statute and was unknown to the common law. The homestead laws are of two classes, those enacted by Congress and those enacted by the state Legislatures. The primary object of the first class is to enable citizens without capital to acquire homes. The object of the second class is to secure homes, once acquired, against the claims of creditors.

The Federal Homestead Laws begin with the act passed in 1862, now a part of the United States Revised Statutes. Their policy is to give portions of the public lands to those who will settle, cultivate and make homes upon them. Any person who is the head of a family or who is 21 years of age and is a citizen of the United States, or who has filed his declaration to become such, may acquire a tract of 160 acres of land, on condition of settlement, cultivation and continuous occupancy for five years and of the payment of certain moderate fees. Under the provisions of these laws more than 85,000,000 acres of unoccupied public lands have been transferred by the United States to homestead settlers, and most of the public land available has been occupied.

State legislation provides three methods by which a homestead may be secured against the debts of its owner. The first is by prescribed form of public notice; the second, by actual occupancy and use; and the third, by a proceeding in a court of justice. The amount of land which may be exempted under the

Homestead Laws varies in the different states. In some the limits are those of acreage, in others those of cash value. See LANDS, PUBLIC.

Homestead, Pa., a city of Allegheny Co., 7 m. s.e. of Pittsburgh, of which city it is a suburb, on the Monongahela River and on the Pittsburgh & Lake Erie and the Pennsylvania railroads. Homestead has one of the largest steel plants in the United States, employing about 7000 men, and producing both structural and nickel-steel armor plate. The borough has also manufactories of fire brick, glass, machinery and other articles. It was settled in 1871 and incorporated in 1880. Population in 1920, U. S. Census, 20,452.

Hondu'ras. See CENTRAL AMERICA.

Honey, *Hun' ny,* a sweet, liquid, transparent vegetable food product made by bees from the nectar of flowers and deposited by them in the cells of their honeycomb as a food for themselves and their young. When produced by young bees, it is called virgin honey, and is much whiter, purer and better than that made by old bees. Honey derives its flavor largely from the plants from which the bees collect it. Honey forms not only a valuable, healthful food, but it is also used largely in medicine as a laxative and as an expectorant in cough remedies. Honey is generally sold as a liquid, after being extracted from the honeycomb, although much of it is marketed in the comb. Honey is adulterated chiefly with glucose and cane sugar. See BEE; GLUCOSE.

Honeybee. See BEE, subhead *Honeybee.*

Honey Locust, a large tree of the Pea, or Pulse, Family, found occasionally in forests but attaining its greatest growth when isolated. It then has a broad, rounded top and drooping, lateral branches, which make it easily recognized. The bark of the locust is made up of thin scales closely pressed to the trunk. The leaves have many tiny, oval leaflets, and at the base of each leafstalk is a long, shiny, brown thorn. The flowers, which are green and rich in honey, produce long, curly pods that are so thin as to disclose the position of every tiny seed contained within. The honey locust is found in central United States, and its wood, which is strong and durable, is used in making posts and railway ties. The mesquite is also called the honey locust. See MESQUITE.

Honeysuckle, a name given to a number of shrubs and herbs of the Honeysuckle Family. The true honeysuckles have twining, woody stems with leaves generally evergreen, the upper pairs being united about the stems. The flower has a long red or yellow tube with five short lobes, as in the trumpet honeysuckle, or two white or purple lips, one broad and one narrow, as in the European honeysuckle. Several wild species are also found which have smooth leaves, white, scentless flowers and more bushy stems. The fruit is a red berry. The fly honeysuckles are upright bushes, with leaves never united and with a pair of flowers on a stem. These flowers ripen into two berries, which are often united. The Tartarian fly honeysuckle is most common in cultivation, as its pinkish flowers are profuse and showy in the spring. There are wild species having yellow flowers and round-lobed leaves. These have red or purple berries. The wild columbine is sometimes wrongly called wild honeysuckle.

HONEYSUCKLE

Hong'kong', a British island possession, separated from the southeast coast of China by the narrow channel known as Ly-e-Mun (Carpfish Pass). It is 10½ m. long and contains an area of 29 sq. m. The outline of the island is

very irregular, and its surface consists of bald ranges of irregular granite hills between which wind bleak and dreary valleys. Victoria Park, the highest point, is 1825 ft. above sea level. Victoria, the capital and largest city, is situated on a beautiful bay along the north shore. It contains the Anglican and Roman cathedrals, the city hall, Queen's College, the Government House, the Clock Tower, the large business houses and warehouses. The products of the island are oranges, pears, mangoes, lichens and building stone. The articles of commerce are flour, ivory, mercury, opium, betel, amber, wools, salt, cotton and sugar. Among the industries are granite quarrying, sugar refining, tanning, cotton spinning and weaving, ship and boat building, rope making, wood and ivory carving and gold beating

Hongkong is a free port. It was made a separate colony in 1843, and since 1857 has no longer been under the control of the minister-plenipotentiary to China, but has had its own governor and council. Population of the island in 1906, 326,961.

Hon"olu'lu, the capital city of the Hawaiian Islands, situated on the south coast of Oahu and forming one of the great ports of the Pacific. The pleasant climate has always made Honolulu an attractive residence city, and as it was originally well laid out, it has been easily kept beautiful. Much attention has been given streets, squares and public gardens, and the favorable climate has made vegetation luxuriant. Among the interesting buildings are the large government buildings, the former royal palace, a public library, a museum, theater and several excellent hospitals. The numerous schools and colleges make the city an educational center for the islands. The industries are represented by the great warehouses, the wharves, with facilities for the largest vessels, the foundries and the manufactories of iron, carriages and ice. Steamship service unites the city with San Francisco and other Pacific ports. The newspapers of the city are published in Hawaiian, Japanese, Chinese and many European languages. Population in 1920, U. S. census, 83,327.

Hood, John Bell (1831-1879), an American soldier, born in Owingsville, Ky., and educated at West Point. In 1861 he entered the Confederate service. He commanded the largest division of Longstreet's corps at Gettysburg, and lost a leg at Chickamauga. As lieutenant-general he served with Johnston in the Atlanta campaign, superseding him in command in July, 1864, and in accordance with his instructions to draw Sherman out of Georgia, immediately marched northward into Tennessee. His army was almost annihilated at Franklin and Nashville, and he was relieved of command, at his own request, in January, 1865.

Hood, Robin, in English legends, a hero outlaw, first mentioned in the second edition of *Piers the Plowman*, about 1377. He was variously represented: as the last of the Saxons, resisting Norman encroachment; as a follower of Simon de Montfort; as the insurgent Earl of Lancaster; or as one Robert Locksley, a manslayer. His comrades were principally Lieutenant Little John, Chaplain Friar Tuck, William Scathlock, George-a-Green, Much and Maid Marian. With these he was supposed to dwell in Sherwood Forest, in Nottinghamshire, and in woods of Barnsdale, in West Riding. Robin Hood, as the people's ideal, was a yeoman, a brave, jocular sportsman and an especially apt archer, who gave to the poor what he stole from the rich.

Hood, Thomas (1799-1845), an English poet and humorist, born in London. In 1821 he became editor of the *London Magazine,* and in 1830 began the publication of the *Comic Annual,* in which appeared some of his most humorous, whimsical productions. He lived in Coblenz, Germany, from 1835 to 1840. After his return to London he was the editor of the *New Monthly Magazine,* and later established *Hood's Magazine.* His fondness for punning became a serious fault, but in his better moments his wit and intermingling of comedy

and pathos were admirable. On a bed of sickness which became his deathbed, he wrote the incomparable *Bridge of Sighs* and *Song of the Shirt.* He touched on the great human and social interests of his time, his pictures of poverty and toil emphasizing the need for immediate relief. Other works are *Hero and Leander, Eugene Aram's Dream* and *Ode to Melancholy.*

Hooded Seal. See SEAL.

Hoog'ly River. See HUGLI RIVER.

Hooker, Joseph (1814-1879), an American soldier, born in Hadley, Mass., and educated at West Point. He resigned from the army in 1858 and engaged in private business in California until May, 1861. He was then appointed brigadier-general of volunteers and was assigned to the Army of the Potomac, in which he became popularly known as "Fighting Joe" Hooker. He distinguished himself during the Peninsula Campaign, at South Mountain and at Antietam, where he was severely wounded, and soon after was appointed brigadier-general in the regular army. Subsequently he was division commander at Fredericksburg, and in January, 1863, succeeded General Burnside in command of the Army of the Potomac. However, after a crushing defeat at Chancellorsville (See CHANCELLORSVILLE, BATTLE OF), he was superseded by General Meade, at his own request. Then joining Rosecrans, Hooker distinguished himself in the "Battle Above the Clouds" (Lookout Mountain), being thereupon brevetted major-general in the regular army, and with Sherman did efficient work in the Atlanta campaign of 1864.

Hooker, Richard (about 1553-1600), an illustrious English theologian, born at Exeter. Through the influence of Bishop Jewel of Salisbury, he was sent to Oxford when about 15. In 1582 he took holy orders, and soon plunged into that controversy with Puritanism which caused him to write his great work, *The Laws of Ecclesiastical Polity.* Four of its eight books appeared in 1594 and the last three after his death. It presents Hooker's theory of the origin of government and its bearing on the Church, and defends the Anglican Church.

Hooker, Thomas (about 1586-1647), an American colonist and clergyman, born in Leicestershire, England. He was educated at Cambridge, and entered the ministry in London. In 1633 he came to New England and settled in Cambridge. In 1636 he and his congregation removed to the Connecticut Valley, and established a settlement at Hartford. In 1639 he had a conference with John Winthrop regarding the formation of the New England Confederation as a means of defense against the French and Indians. This conference resulted in the adoption of the *Fundamental Orders,* which became effective the same year and formed the first of any kind of constitution in this country. Hooker was the author of *An Exposition of the Principles of Religion, The Soule's Ingrafting Into Christ* and *The Saint's Guide.* See CONNECTICUT, FUNDAMENTAL ORDERS OF.

Hook'worm", a microscopic, cylindrical worm so named because of the sharp, strong hooks in the mouth. There are several species, all of which are parasites, some upon man and some upon cattle. Those attacking man are the cause of a serious disease variously known as hookworm disease, miners' anæmia, tunnel disease, brickmakers' disease and Egyptian chlorosis. The worms are small white objects from one-half to three-fourths of an inch long and having about the same circumference as No. 8 cotton thread. They enter the body upon unclean foods, such as lettuce, celery, onions, strawberries, radishes, etc., that have been grown in polluted soil or treated with infected fertilizer, or they crawl through the skin of the feet of a person walking barefoot or wearing leaky shoes on damp, polluted ground. Drinking infected water or wading in infected streams is also a common means of allowing their entrance. Through the blood the worms reach the lungs and throat and from there make their way to the small in-

testines, where they cling to the walls, suck the blood and inject a poison into the circulation. They multiply rapidly, and though the adults are able to live only in the intestines, the eggs pass out in the discharges, and the hatching worms live in water or the soil until they can again find entrance into the human body.

The disease which these parasites cause manifests itself in impaired digestion, pain in the stomach, headache, shortness of breath, diarrhea or constipation, sores, swelling of the limbs, dizziness and stunted growth. In mild cases only a few of these symptoms appear. Hookworm disease is a slowly-developing disease and for that reason is perhaps less regarded than a deadly epidemic, which generally receives widespread and speedy attention.

In southern United States, the Philippines, Porto Rico, Guam, Egypt and southern Europe much attention is being given to the extermination of the hookworm. Three suggestions are made by the Arkansas Board of Health in regard to stamping out the disease: (1) the wearing of good shoes; (2) the curing of all infected persons; and (3) the installation of sanitary sewage systems. The presence of the hookworm in the intestines may be discovered by medical examination, and a treatment by means of cathartics, especially Epsom salts, and thymol being found effective in its cure.

Hoover, Herbert Clarke (1874—). A celebrated mining engineer and man of affairs, becoming prominent in the World War as an organizer of government relief work. He was born at West Branch, Iowa, educated at the Leland Stanford Junior University, graduating in 1895. He was a member of the United States Geological Survey for the Sierra Mountains. Subsequently, he became widely known as a mining expert and manager of extensive mining properties in Australia. He was chief engineer of the Chinese Imperial Bureau of Mines and made extensive exploration in the interior of China. Afterwards he was manager and mining expert for many properties in various countries in the Far East. When the World War broke out, he attracted attention by his management of various relief organizations in Europe, especially the Belgian Relief Organization. In 1917 he was appointed Food Supervisor for the United States. After the war he continued to act as chairman of relief organizations, paying special attention to famine stricken sections of Europe. In 1921 President Harding appointed him Secretary of Commerce.

Hoopoe, *Hoo' poo,* a bird related to the Hornbill Family, living in Europe, Asia and Africa. The best-known species is about a foot long, and is a brownish or buff-colored bird with black wings and tail, more or less barred with black

HOOPOE

and white. The bill is long and slender and slightly curved, and the head is surmounted by a large, orange-brown crest, extending from the bill to the back of the head, which may be raised and lowered at will. The nest is usually made in hollow trees, but fissures in rocks, as well as holes in banks, are used. Five to seven greenish-blue eggs are laid. Incubation occupies 16 days. The hoopoe feeds principally on insects. It has the peculiar habit of rapping large objects on the ground and tossing them in the air before swallowing them.

Hoo'sac Tunnel, one of the longest railway tunnels of the United States. It passes over four miles through Hoosac Mountain in northwestern Massachusetts,

and was constructed for the Boston & Albany Railroad at a cost of $11,000,000. The tunnel was begun in 1856, but was not completed until 1873. Near its center a ventilating shaft 1028 ft. deep has been sunk. Two tracks extend through the tunnel, which is 24 ft. wide and 22⅔ ft. high.

Hop, an important, climbing plant of the Nettle Family used sparingly as a medicine and in large quantities in the manufacture of beer and other malt liquors. The plant has long, twining stems and broad, three- to seven-lobed leaves, heart-shaped in form and notched

HOPS

on the margins. The flowers upon one plant are stamen-bearing, or staminate, and those upon another fruit-producing, or pistillate. The pistillate plants are the only ones of importance, since their flowers are the ones used commercially. They are inconspicuous and grow in scale-covered, conelike clusters, which are yellowish-green in color and soft in texture. Hops are grown in rows and climbing upon poles, which arrangement allows them to present a sufficient surface to the sunlight and to hold the blossoms up so that they may develop well. The picking, which takes place when the flower cones become papery or turn to a darker yellow, occupies about two weeks and must be done at the proper time, as otherwise the flowers are liable to lose their "hop meal," a yellowish dust, which is found at the base of the flowers and which is an important ingredient in beer making. After being picked, the hops, as the flower heads are called, are dried, either artificially or by sun heat, and stored until required for use.

There are many species, each of which has its own claim to importance. The chief hop-producing countries are the United States, Germany, Great Britain and Austria; in the United States, Oregon, California and New York lead in the amount and quality produced. As a medicine, hops are used to make a remedy for dyspepsia, and hop pillows are said to induce sleep.

Hopkins, John Castell (1864-), a Canadian editor and author, born in Iowa. In 1893 he resigned as associate editor of the Toronto *Daily Empire* to devote his entire attention to literary pursuits. He has contributed to such publications as the *Westminster Review, Forum, North American Review,* London *Times* and Glasgow *Herald,* and is the author of *Toronto: An Historical Sketch, Life and Work of Mr. Gladstone, History of South Africa* and *Life of King Edward VII.* He has, moreover, edited various Canadian annuals and written innumerable pamphlets on historical subjects.

Hopkins, Stephen (1707-1785), an American statesman, signer of the Declaration of Independence, born in Rhode Island. Early a merchant and surveyor, he became a member of the General Assembly in 1732. In 1739 he became chief justice of the Court of Common Pleas and in 1751, of the Superior Court. Three years later he was a delegate to the Albany Convention, and, excepting four years, was governor of Rhode Island from 1754 to 1768. He was a member of the First Continental Congress from 1776 to 1778. Throughout the Revolutionary period he published many

pamphlets favoring the colonial cause. For many years he was chancellor of Brown University.

Hop'kinson, Joseph (1770-1842), an American jurist and song writer, born in Philadelphia, Pa. After graduating at the University of Pennsylvania in 1786, he rose to high rank in the profession of law. From 1828 until his death he served as district judge, and in 1837 was a member of the Pennsylvania Constitutional Convention. Hopkinson wrote legal essays, but is best remembered for the national song *Hail Columbia,* which not only attained immediate popularity, but is today a favorite.

Hopkinsville, Ky., a city and the county seat of Christian Co., 71 m. n.w. of Nashville, Tenn., on the Illinois Central, the Louisville & Nashville and other railroads. The principal industrial interests are connected with the cultivation of tobacco and the preparing of this product for the market. The manufactures include flour, lumber, wagons, carriages, lime and brick. There is considerable trade in coal, live stock, hay, wheat, corn and flour. Hopkinsville is the seat of Bethel Female College, of South Kentucky College, a coeducational college, and of the Western Kentucky Asylum for the Insane. Hopkinsville was named in honor of Samuel Hopkins, pioneer, soldier and congressman. The place was incorporated in 1798 and is governed under a revised charter of 1896. Population in 1920, 9,696.

Hor'ace (Quintus Horatius Flaccus) (65-8 B. C.), a Roman poet, born at Venusia, a small town in Apulia. His father left the farm and removed to Rome, and the son, profiting by these improved advantages for receiving an education, soon became well versed in Latin and Greek literature and philosophy. Lack of money drove him to writing verse, and friendship with Vergil, Varius and Mæcenas brought him into the companionship of the best literary men of his age. His first book of satires, called *Sermones,* was issued in 35 B. C. Another volume followed a few years later, a marked advance on the first, which had received but slight favorable comment. At the age of 42 he published the first three books of his *Odes,* and the excellence of this work brought him immediately into the front rank of poets. The *Epistles* followed, the second volume of which was devoted to literary criticism, and the third probably containing his formal essay, *Art of Poetry.*

Next to Vergil, and possibly not excepting him, Horace has been the most widely read of all the Roman writers. He wrote a great deal about himself, and one of the notes of originality in his work is the intimate, personal relationship that he establishes between himself and the reader. A truthful and accurate painter of the social life and manners of the ancient world, he is neither passionate nor ecstatic, nor mystical, but for the inspiration of his odes he drew freely upon the pleasures of a life lived among the Sabine hills, and from the leisure and peace of the open. In his later writings there is a manly Stoicism gradually replacing the passive Epicureanism of his younger years, and his philosophy is that of a genuine moralist who makes the most of life, at the same time reflecting without anxiety on a certain departure from the world. He was a master of simple and natural style, of form, meter and rhythm, of stateliness and dignity of expression.

Hore'hound", Hoar'hound", a common, rough herb of the Mint Family whose leaves and tops are used medicinally. The plant has a square, erect stem, opposite, heart-shaped leaves with wavy edges, and clusters of tiny, lavender flowers, growing around the stem in the axils of each pair of leaves. The entire plant has a pleasing, aromatic odor. There are two distinct species, the black and the white horehound, each of which is valued medicinally. The plant is native in Europe and Asia and has been brought to the United States, where it is produced in herb gardens for the use of drug factories. As a medicine horehound is chiefly used as a

cough or throat remedy and is often put up in candy form.

Horn, the name given in a general sense to the hard, bonelike substance growing from the heads of animals, such as deer, cattle, sheep and goats. There are two kinds of horn, one being a prolongation of growth of the actual bone structure and the other being a hardening of the epidermis, or outer layer of the skin. Horn is a hard, tough, flexible, translucent substance found in its greatest development among animals of the Ox Family and also in the shell of the tortoise, and the nails, hoofs, bills and quills of other creatures.

Horn can be softened by heat and rendered flexible, as well as weldable, and is easily stamped and otherwise fabricated into various articles, such as handles for knives, forks, canes and umbrellas, for combs, buttons, drinking cups and many varieties of boxes. At one time thin plates of horn were used for windowpanes, lanterns and book covers. See TORTOISE SHELL.

Horn, the name of a large class of musical instruments, originally formed from the horn of an animal. The horns in most common use are in the form of a twisted tube with a cup-shaped mouthpiece and terminate in a spreading bell. Horns are of two kinds—the natural and the valve horn. The tone of the natural horn is regulated by the force of the performer's breath, the pressure of his lips, or by "stopping" the orifice of the instrument by inserting his hand in it. In the valve horns there are three pistons, operated by the player's fingers, which give to the tube additional sections, in this way varying the pitch. By using them separately, or in combination, the pitch may be lowered anywhere from a semitone to three whole tones.

Horn'beam", a substantial tree of the Birch Family, one species of which is native in North America. The tree is often found in groves of maples or elms or along banks of streams, where its thick foliage gives a delightful shade. The hornbeam has an irregular trunk covered with a tight, gray bark, much like that of the beech, and often shaded with light or darker spots. The branches are tough and marked by long, twisted grooves. The leaves are long-oval, pointed, and sharply-toothed; the veins form prominent ridges on the underside of the leaf. The flowers are inconspicuous, but the fruit, which is a dry, winged nut, is foliagelike and adds greatly to the beauty of the tree. The wood is hard and tough and light brown in color; it is used for fuel or occasionally in the manufacture of woodenware. Hornbeam is is also called blue beech, water beech and ironwood. It grows in North America from Quebec to Central America, and in the Old World from Sweden to southern Europe, in Asia Minor, in China and in Japan. See IRONWOOD.

Horn'bill" Family, birds related to the woodpeckers, easily recognized by the long, pointed bill, the upper mandible of which is peculiarly modified, being widened out or forming a great hornylike projection. In size the species vary from one and one-half to four feet. A number of species nest in hollow trees, laying two to four eggs. While the female is sitting upon the eggs the male plasters up the opening with mud, leaving a small aperture through which she may be fed. When the young are ready to fly, the male breaks down the plaster and releases the family. The hornbills, of which about 70 species are known, are confined to the warmer regions of India, Africa and Malaysia.

RHINOCEROS HORNBILL. This is about 45 inches in length and is the best-known species. The general color is black, with steely reflections; the rump, tail coverts and abdomen are white; the tail is white, with a black band; the bill is yellowish; and the horny appendage is black, red and orange.

Hornblende, *Horn' blend",* one of the most abundant and widely distributed of minerals. It is an important constituent of many different kinds of rock, chiefly granites and basalts. It crystallizes in a diversity of forms and displays a variety of colors. Hornblende is brittle, has a glossy luster and is of

the hardness of feldspar. Some species are opaque, others transparent. It forms needlelike crystals, arranged in various ways, and it may be green, pink, white or black, forming beautiful cabinet specimens.

Horned Toad, a desert lizard of the Iguana Family represented by 15 species, all of which might better be spoken of as horned lizards. They inhabit the United States, chiefly the southwestern part, and are recognizable by their flat, toadlike bodies with a fringe of marginal spines. The scales, with which they are covered, are fine, but the head has large, ferocious-looking spikes on the chin, temples and back. These lizards are remarkably swift and run about in the sun on the hot desert sand after their insect prey. The Texas horned toad, which is the species generally brought East by tourists, has the peculiar defensive power of squirting, from a gland beneath the eye, a fine stream of blood calculated to blind its enemy. See LIZARD.

Hornell', N. Y., a city of Steuben Co., 93 m. s.e. of Buffalo, on the Canisteo River and on the Erie and the Pittsburgh, Shawmut & Northern railroads. It was known as Upper Canisteo until 1820, when it was incorporated as a separate town. The city has several public parks, and contains a free library, St. Ann's Academy and St. James Mercy Hospital. Its manufactures include railway supplies, white goods, electrical machinery, sash, doors, furniture and other articles. Population in 1920, U. S. Census, 15,025.

Hor'net, a family of large wasps of the order Hymenoptera. In color, hornets are brown or black and banded with white or yellow lines. Their nests are constructed in the eaves of buildings, in hollow tree trunks, the branches of trees or even below ground, and are made of the thin, gray wasp paper which they manufacture from small pieces of wood and leaves. These nests are often so large that two or three branches are necessary to support them, and there are several enveloping layers of the paper. Hornets are social wasps living in colonies and feeding upon insects, honey and pollen. They have long stings which can cause painful wounds. See WASP.

Horse, a family belonging to the order of solid-hoofed animals, or Ungulata, and containing members that have been of the greatest service to man in the progress of civilization. The graceful carriage horses and the heavy draft horses of today are very different from their common ancestor, which was of small size and had five toes upon each foot. The modern horse is an importation of Asian descent, coming either from hardy Northern stock or the fleet Arabian steed. Careful breeding has developed two main classes from these, the light and the heavy horses. The former are those required for light work and for speed; they are classed as running, trotting, pacing, saddle, coach or express horses. The draft horses are of three classes: light draft, weighing from 1500 to 1600 lb.; the medium draft, from 1600 to 1800 lb.; and the heavy draft, from 1800 up.

The points by which a horse is judged vary according to the purpose for which it is desired. In general, a light horse should be tall and have long limbs and a greyhound build. The distance from its chest to the ground should be more than one-half the distance from the withers to the ground, and its chest should be narrow but deep. Draft horses, on the contrary, should be of massive build, broad and low set. At maturity they should weigh from 1500 to 2400 lb.

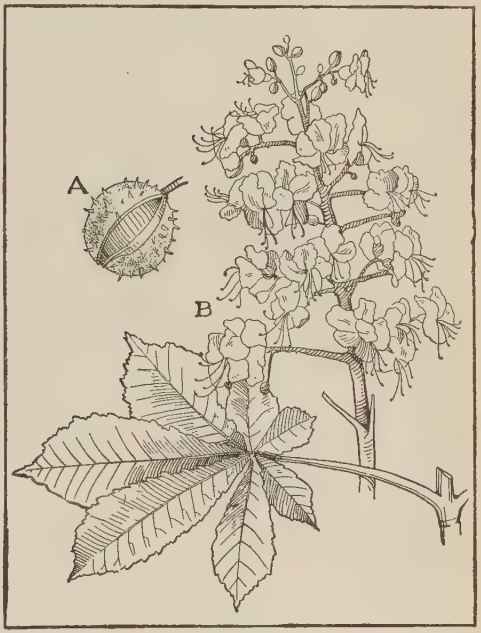
BREEDS. Much attention has been given to the breeding of horses for different purposes. There are four principal breeds of draft horses in America. The Percheron, which was developed in France, is a deep-bodied type, generally of gray color, and is popular in the West; it is this type that was the subject of Rosa Bonheur's picture, *The Horse Fair.* The Belgian, developed in Belgium, is more blocky than the Percheron, and is generally roan, chestnut or bay in color. The Clydesdale breed, developed in Scotland, has longer legs

and lighter body; its colors are brown or black, usually with white markings, especially upon the feet. The Shire, developed in England, is much like the Clydesdale, but is heavier.

There are seven principal breeds of light horses, used chiefly as carriage or running horses. Of these the German coach and the French coach are the largest, both being from 16 to 16½ hands high. The Hackney, an English breed, is smaller, but is noted for its power of endurance, splendid constitution and good action. The Cleveland Bay, also a coach horse, is large and strong, but not of as pleasing build. Roadsters are bred for speed and are slender in body and have longer legs than the coach horses. The thoroughbred is a cross between the light English horse and the Arabian horse. It is of lithe form and graceful build. A Kentucky horse of this breed holds the world's record of one mile in one minute, 35½ seconds. The American trotter and the American, or Kentucky, saddle horse differ chiefly in pace; they were developed in the United States, principally in Kentucky.

Ponies are small horses noted for their speed and endurance (See PONY). The ass is a domesticated member of the Horse Family used as a beast of burden, and the mule is a cross between the horse and the ass (See ASS; MULE). For practical discussion of the horse, its care, training and diseases, and of horse breeding, consult Harper, *The Training and Breaking of Horses;* Harper, *Manual of Farm Animals;* Marshall, *Breeding of Farm Animals.*

Horse-Chestnut, a popular shade tree of the Horse-Chestnut Family, easily recognized in summer by its large, star-like clusters of leaves, and in winter, by its large resin-covered buds. It is a large tree, with a rounding top, which is of sufficient size to shade a great area of lawn. The bark is scaly; the branches, dividing not far from the ground, are completely covered by spreading, blunt-topped leaflets, which are arranged so as to present a wide surface to the sunlight. In summer the stiff, full clusters of white or yellow, red-spotted blossoms are very showy. The fruit is globular and is covered by a three-divided, prickly bur of yellowish green color without, and having a soft, white lining within. The nuts, of which there may be one, two or even three in a shell, have a leathery, shining brown coat with a noticeable, tan-colored base and two plump but bitter-tasting seed leaves. The bark of the



HORSE-CHESTNUT

horse-chestnut is useful in medicine and for tanning purposes; the wood is used for the blind work of cabinetmaking and for the manufacture of artificial limbs. The tree grows commonly throughout the United States and Europe. In the accompanying cut A represents the prickly, half-opened bur from which the nut has fallen; B is a spike of the showy blossoms with a single spreading leaf.

Horsefly. See GADFLY.

Horse Latitudes, belts of calms near the tropics of Cancer and Capricorn. These belts are not continuous, but within them occur regions of calms separated by regions where winds are blowing. *Horse latitudes* is the sailors' name

for these calms, because years ago, when ships transporting horses were becalmed for a long time along the Tropic of Cancer, some of the horses were thrown overboard.

Horse Mack'erel. See TU'NA.

Horse'rad"ish, a coarse plant of the Mustard Family whose tough, white roots are ground or grated and used as a condiment with meats. The leaves are long and rough and have somewhat the same spicy flavor as the root; they are used for greens. The branching stem grows to a height of from two to four feet in fence corners, vacant lots and along the roadside, where it is looked upon as a common weed, except in the spring when the gathering and preparing of its roots gives profitable employment to the small boy. The grated horseradish is put up with vinegar, but, unless soon eaten, loses its peppery flavor and becomes flat to the taste.

Horse'shoe", a thin metal plate, usually of iron, designed to fit a horse's hoof and protect it from wear. It is especially necessary when horses are worked on hard roadways. The shoe is bent and forged to a shape to fit the bottom of the hoof, and held securely in place by nails driven through holes in the shoe and through the outer layer of the hoof. This work is performed by a horseshoer, who is usually a blacksmith and who has a forge, anvil and the requisite tools. Shoes for horses that work on icy roads are provided with steel points or calks, one at each heel of the shoe and one at the toe. Those horses drawing loads on soft roads have shoes with soft-iron calks, while pleasure-driving horses are shod with plain shoes. Race horses usually have only a very thin plate instead of the heavy shoe of draft horses. Horseshoes are made now principally by machines and of soft steel instead of iron. Farm horses are generally unshod. Iron horseshoes were introduced into Europe about the ninth century, and taken to England by the Normans. For centuries, the shoemaker's art had great honor in France and England.

Horseshoe Crab, or **King Crab,** an order of the group Arachnida whose members are recognized by their appendages as being closely related to scorpions, spiders and mites. They have firm, polished shells, shaped like a horseshoe, and long, pointed tails. They are aquatic and frequent muddy shores or soft bottoms at a depth of from four to six fathoms. The shells have a prominent median ridge, on either side of which, near the front, lies a small median eye; farther back and nearer the outer edges of the shell are two large, lateral eyes. The mouth is still farther back and is large enough to be easily reached by the appendages which assist in the feeding. The food consists of bivalves and Mollusks of all sorts. There are four species of horseshoe crabs—one found in the United States, one in China and Japan and two in the East Indies.

Horsetail, or **Equisetum,** *Ek" wi se' tum,* one of the highest forms of spore-producing plants and a member of the Horsetail Family. Though these plants are found all over the world, there is but one genus known at present and this is represented by only 25 species. From what we are able to learn of these plants in previous geological periods, we are led to believe that the horsetails were once an important family including, not only small plants as at present, but trees which grew to a height of nearly 100 ft. Now, the commonest species are low plants often found growing along railroad tracks or in dry waste ground, but occasionally discovered in swamps or deep woods; there is, however, one South American species that attains a height of 40 ft. The horsetail rises from a branching rootstock which is apt to have tiny tubers for storing nourishment for its period of hibernation. The stem is erect and hollow; those which remain unbranched are fertile plants and will bear spores, the tiny bodies which take the place of seeds; others branch and are commonly sterile plants. The leaves are scalelike structures which unite into cups surrounding the stems at regular intervals. The

branches grow from the axils of the leaves, and encircle the stem in a spreading whorl with the leaf cup at their bases. The unfertile horsetails end in a pointed stem, but the fertile produce a conelike cap which contains the spores. The method of reproduction by means of these spores is extremely complicated.

The horsetails are easily recognized by their peculiar growth, lack of ordinary green coloring matter and their consequent yellowish-brown color. Moreover, the stems of all horsetails contain a great deal of silica, which makes their fibers and cell walls so hard that they are used in polishing wood and metal.

HORSETAIL

Hor'ticul"ture, a branch of agriculture which deals with the growing of fruits, vegetables, ornamental shrubs and flowering plants. It formerly referred only to the care of the garden, but with the increased study of agriculture in schools and colleges, horticulture has developed into a profession which includes many departments. The successful horticulturist must have a practical knowledge of botany, especially with regard to variations of species and the laws that govern them, plant diseases and their treatment, soils, fruit development, etc. The various departments of horticulture are commonly known as: truck farming, or market gardening, which is the raising of vegetables for the market; pomology, which is the study of fruits; arboriculture, which is the cultivation of trees; and floriculture, which is the cultivation of shrubs, ornamental trees and flowering plants. See AGRICULTURE; FORESTRY; GARDENING.

Hosea, *Ho ze' a,* a book of the Old Testament following *Daniel* and preceding *Joel;* also the name of the author of this book, one of the minor Hebrew prophets. Hosea began to prophesy under Uzziah, King of Judah, and Jeroboam, King of Israel, continuing his prophesying until the time of Hezekiah, great-grandson of Uzziah. The book of *Hosea* contains: (1) a symbolical representation of the adoption, rebellion and rejection of the people, the conversion of the Gentiles and the final restoration of Israel; (2) prophetic discourses, illustrated by vivid imagery. See BIBLE, subhead *The Old Testament.*

Hosmer, *Hoz' mer,* **Harriet Goodhue** (1830-1908), an American sculptor. She studied anatomy in the St. Louis Medical College and clay modeling at Boston, and at the age of 22 went to Rome. The remainder of her life was spent in Italy. She became known in 1856 through an exhibition of a statuette, called *Puck.* Among her most noteworthy productions are *Zenobia in Chains, The Sleeping Faun, A Waking Faun* and *Beatrice Cenci.*

Hos'pital, an institution for giving medical treatment to the sick or injured. Hospitals were founded in India, Persia and Arabia long before the Christian Era. The Greeks and Romans maintained shelter houses, with attendants, for the sick. One of the earliest of these institutions was that founded by Valens in 370. In the time of the Crusades numerous hospitals were built, and knights called hospitalers were in attendance.

All hospitals belong to one or the other of two principal groups, the general and the special. General hospitals are of two kinds: (1) clinical and (2) nonclinical. The clinical hospital is at-

tached to a medical school and usually is situated in its immediate vicinity. These institutions are intended primarily for the care of the sick and wounded, and secondarily to furnish means of instruction to students of medicine and of nursing. The nurses in these hospitals are under the immediate control of an interne, or resident doctor, who has obtained the position through competitive examination. The interne is under supervision of the school instructors, who may be also practicing physicians and who visit the hospital at specified times. A nonclinical hospital is one that is not connected with a medical school and to which students of medicine are not admitted for observation.

Special hospitals are those which make a specialty of treating one disease or one class of persons to the exclusion of all others. In the former group are hospitals for cancer, tuberculosis, paralysis, erysipelas, skin diseases and for treatment of diseases of the eye, ear, nose and throat. To the latter group belong women's hospitals, children's hospitals, military and naval hospitals, and hospitals for the insane.

The main principles of hospital construction and operation are pretty generally followed in all medical practice. The important feature of the hospital is the ward, a large room intended to accommodate several patients on single beds. Wherever possible the wards should be separated from the remainder of the hospital and should be built as pavilions of one or not more than two stories. A representative institution employing the pavilion plan in the Johns Hopkins Medical School, Baltimore, Md. Its pavilions are two stories high, and each contains two wards which occupy the entire upper and lower floors. These buildings are arranged in rows and connected by tunnels beneath the corridors. A large number of city hospitals are contained in a single building several stories in height, and constructed to provide every facility for treatment.

Hospital, Military, a place for the care and treatment of sick or wounded soldiers. Military hospitals are of two kinds, permanent and field hospitals. Permanent hospitals are established in convenient and sanitary places, and at army posts and forts. The General Medical Hospital at Ft. Bayard, New Mexico, is maintained for the treatment of consumptives from the United States army and navy. At Hot Springs, Ark., officers and men, whether active or retired, are treated. Field hospitals are portable, and can be very quickly put in readiness to receive those who may be wounded in the field. From these field hospitals the wounded are removed, as soon as possible, to the station hospital, which is placed between the field of action and the base of supplies.

Hospital Ship, a ship accompanying all warlike expeditions, to care for the sick and wounded. The hospital ships of the United States navy are fitted to serve either as stationary or movable hospitals as occasion may require. They are painted white, with green bands along the sides, and fly the Red Cross flag and the national flag. Hospital ships are regarded by all civilized nations as exempt from attack so long as they are not armed, and give aid to only the sick and wounded.

Hos'tage, a person given as a pledge for the fulfillment of certain conditions. Hostages were formerly exchanged between parties at war with each other, as guaranty that prisoners would be properly treated, or that a city captured would not be destroyed. When the conditions are fulfilled the hostages are returned. If the conditions are not fulfilled the hostage may be put to death or otherwise punished.

Hot-Air Engine, an engine having its piston propelled by the expansive force of heated air. It differs from the steam engine in design, principle and construction, as it uses air at very low pressures. It consists of a light, upright frame, with bearings at the top carrying a crank shaft with pulleys and flywheels and a connecting rod. In the bottom of the frame is hung a combustion chamber arranged to burn gas, coal

or wood, and over it rests an upright cylinder into which is fitted a piston. When the air is heated, the piston moves up and the air is exhausted at the end of the stroke through valves, and when the cylinder is cooled by water, the piston moves down or returns, and so on. Hot-air engines are built in sizes of from half-horse to 10-horsepower, and are used chiefly for pumping water.

Hotbed and Cold Frame, common terms used to express a seedbed and its covering. A hotbed is a seedbed, made by having a deep layer of fermenting compost or horse manure mixed with a few inches of fine, sifted loam, and a cold frame is the wooden frame with a glass or cloth cover placed around and over the hotbed to protect the plants growing in the beds from frost and rain. It is employed in starting plants before removal to a greenhouse. The fermentation heats the soil, while the cold frame prevents a too rapid radiation and loss of heat. They are sometimes used separately, especially in warm climates. Cold frames are frequently used alone to force violets into bloom. There is no heat except sunlight used in hotbeds or under cold frames. The cold frame should slope with its glass roof towards the south, and should be hinged and arranged so as to allow for the ventilation of the hotbed. See GREENHOUSE.

Hotch'kiss, Benjamin Berkely (1826-1885), an American inventor, born in Watertown, Conn. A machinist, he invented the Hotchkiss magazine gun, which was adopted by the government, as was his system of rifle projectiles, which was extensively used during the Civil War. His revolving cannon was introduced into Europe in 1867. Subsequently he invented a magazine rifle.

Hot Springs. See THERMAL SPRINGS.

Hot Springs, Ark., a city and the county seat of Garland Co., 54 m. s.w. of Little Rock, on the Chicago, Rock Island & Pacific, the St. Louis, Iron Mountain & Southern, the Little Rock & Hot Springs Western and other railroads. It is built in several mountain ravines and partly on a plateau, and is one of the most beautiful towns in the United States, being famed for its mineral waters and delightful climate. There are 72 thermal springs rising within an area of ten acres on the side of Hot Springs Mountain. The daily flow from these springs is approximately 1,000,000 gallons. They vary in temperature from 76° to 157° F. and possess remarkable curative properties. Since 1832 the land containing the springs has been a national reservation, and large sums have been expended by the United States Government in improvements. An army and navy hospital has been established here and bathhouses free to the public are maintained. There are numerous other baths, hotels and other accommodations for visitors, who number more than 100,000 annually, and the chief business interests of the town are centered in the care of these transients. Besides the springs, an important natural resource of the city is novaculite rock of fine quality found in the vicinity and from which hones are made. The first permanent settlement on the site dates from 1828; the place was incorporated in 1876 and chartered as a city three years later. Population in 1920, 11,695.

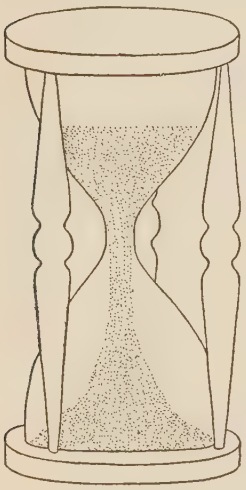
Hot'tentots, a peculiar race living in western Province of Cape of Good Hope and throughout the southern part of Africa. They are of medium height; their skin is an olive-brown; the cheekbones are prominent. The chin is pointed, giving the face a strange, triangular contour. They have been a nomadic race, and as cattle breeders they were constantly moving from one meadow ground to another. Their religion is chiefly ancestor worship. In 1904 the mixed Hottentot population numbered over 85,000, but those of pure blood represent only about one-fourth of this number.

Houdon, *Oo" don',* **Jean Antoine** (1741-1828), a French sculptor, born at Versailles. He made numerous portrait busts of eminent men, among them George Washington. In 1788 he became a member of the French Institute, and

was decorated with the insignia of the Legion of Honor. His chief works are busts of Gluck, Franklin, Mirabeau and Rousseau, a *Statue of Voltaire, Morpheus* and *Diana the Huntress.*

Hough, *Huf,* **Emerson** (1857-), an American author, born in Newton, Iowa, and educated at the State University of Iowa. He has traveled extensively in the western part of the United States, exploring, on skis, Yellowstone Park in the winter of 1895. The outcome of this trip was an act of Congress protecting the Yellowstone buffalo. Besides several short stories for magazines, he has written *The Story of the Cowboy, The Girl at the Halfway House, The Mississippi Bubble, Heart's Desire, Fifty-four Forty or Fight, The Purchase Price* and *Young Alaskans on the Trail.*

Hound, a class of dogs which, because of their keen scent and their speed, are used in the hunt. They have drooping ears, large, rounding heads and, generally, wrinkled faces. Their usual color is black and tan. When the term *hound* is used without a descriptive adjective the foxhound is probably the dog referred to. Other hounds are the bloodhound, staghound, otterhound, harrier, beagle, dachshund, pointer and Dalmatian coach dog; most of these are treated under their respective titles. The greyhounds, which have keen sight, but practically no ability to follow a scent, belong to a group by themselves.



HOURGLASS

Hourglass, a device employed in ancient times to measure an hour and its fractions. Its use dates before sundials and clocks. It consists of two glass bulbs connected by a contracted neck, the upper bulk having a sufficient amount of fine dry sand to flow through the opening in the neck in one hour. The glass bulbs were mounted on a frame, so that one stood above the other, and the sand flowed from the upper to the lower bulb. A modification of it is employed now chiefly as a convenient method of showing the time required to boil eggs, and is known as an egg glass.

Housatonic, *Hoo" sa ton' ik,* a river of the United States, rising in the western part of Massachusetts amid the Berkshire Hills. It flows southward across Connecticut and empties into Long Island Sound. The length is about 150 m., and it is noted for its beautiful scenery.

Houseboat, a type of boat used commonly throughout the world by those who, while enjoying outdoor life and an occasional change of scene, prefer not to abandon the comforts of home life. Some of the older houseboats carry sails, but many are towed from place to place as desired. One steam craft, the *London,* measures 130 ft. over all, and makes 12 knots an hour under favorable conditions. Those equipped with gasoline engines are now most popular. On the Thames, houseboats became popular as early as 1870. They abound on the Pacific coast, and on the Great Mississippi system, on the St. Lawrence, on many lakes, and especially on the extensive waterways of Florida, where some of the largest and best are now found.

Houseleek, or **Live-Forever,** a peculiar low plant of the Orpine Family, frequently found in the United States growing in dooryards or by roadsides, and in England planted upon roofs or walls. The plants reproduce by means of leafy shoots, or suckers, which, after growing out a short distance from the mother-plant, put forth roots and become new households, circled so closely about the old that children call them "old hen and chickens." The stems and leaves of the houseleek are thick and fleshy, the latter growing in circled clusters around the stem; they are oval in form with smooth

edges. The flowers are green or purple with five, pointed, leaflike sepals, five spreading petals and five or ten stamens of unequal length. The undeveloped fruits lie in four erect little pods which are found in the center of the blossoms.

HOUSELEEK

House of Representatives. See CONGRESS.

Houston, *Hu' stun,* **Sam** (1793-1863), soldier and president of Texas, born in Rockbridge County, Va. On the death of his father the family removed to Tennessee where the lad lived much of the time, with the Cherokee Indians, one of whom adopted him as his son. In 1813 he enlisted in the United States army, serving under Andrew Jackson. He resigned from the army in 1818, studied law in Nashville, and began practice at Lebanon. From 1823 to 1827 he served in Congress, and was in the latter year elected governor of Tennessee. From 1829 to 1832 he lived again among the Cherokee Indians, after which he went to Washington in their interest. In 1832 he went to Texas, and in 1835 was made commander-in-chief of the army of Texas in its conflict with Mexico. He was a member of the state convention that declared the independence of Texas in March, 1836, and by defeating Santa Anna in the Battle of San Jacinto in April of the same year made independence an actuality.

In September Houston was elected president of the new republic. He was largely instrumental in the admission of Texas into the Union in 1845, and at that time became United States senator from the new state, serving until 1859, when he was elected governor. In 1861 he retired from public life and went to his home in Huntsville, where he died two years later.

Houston, Tex., a port of entry, the county seat of Harris Co., the third city of the state in size and an important railroad and commercial center. It is located upon Buffalo Bayou, 48 m. n.w. of Galveston and 145 m. s.e. of Austin, on the Southern Pacific, the Gulf, Colorado & Santa Fe, the Missouri, Kansas & Texas, the International & Great Northern, the St. Louis, Brownsville & Mexico and several other railroads. The great Ship Channel, with its turning basin, is 54 m. in length and permits the passage of the largest ocean-going vessels. This, with the numerous railroads, makes Houston a notable shipping point whose importance will increase with the opening of the Panama Canal.

STREETS, BOULEVARDS AND PARKS. Houston has broad, paved streets and is approached by well-kept gravel and shell-graded roads. These are so beautified by handsome magnolia trees that the city is known as the "Magnolia City." Its suburbs are filled with pleasant homes and surrounded by forests of pine, oak, ash, elm and cottonwood. Its park system is extensive and includes Sam Houston Park, Cleveland Park, Elizabeth Baldwin Park, Highland Park, Settegast Park and a boulevard circling the city and at five points in its course broadening into parkways enhanced with gardens and pagodas. Houston has many near-by pleasure resorts, being but an hour by train, interurban or motor from surf bathing and deep-sea fishing.

PUBLIC BUILDINGS. Among the interesting buildings of the city are the new Auditorium, seating 7,000 persons, the county courthouse, the Y. M. C. A. Building, the city hall with its adjacent covered market, the Federal Building, the buildings of Rice Institute, the new terminal station, the Carnegie Lyceum and Library, several modern apartment houses and many handsome office buildings. On the Channel or in various attractive spots in and about the city are the homes of the Houston Launch Club, the Houston Club, the Country Club, the Press Club, the Concordia Club, the Thalian Club, the Turn Verein Club and others. Its hotels are among the finest in the state, and the many churches are exceptionally attractive in appearance.

Aside from the well-equipped schools of the public school system, Houston has Rice Institute of Literature, Art and Science, the St. Agnes Academy and several excellent private schools and business colleges.

Industries. Houston's industries are varied in character. It lies in a farming district in the winter truck-growing section of the South, and is a market for corn, cotton, sugar cane, rice, alfalfa, vegetables, fruits, cattle and dairy products. Its surrounding forests of yellow pine and hard wood make it a notable lumber market, and its red cedar is in constant demand for pencils. There are large coffee-roasting establishments, charcoal kilns, iron foundries, railroad shops, a meat-packing plant and, peculiar to this city, great nurseries where the beautiful Cape jessamine is cultivated for shipment both as a decorative shrub and for its flowers. The manufactured products include hardware, car wheels, elevators and escalators, organs, pianos, cottonseed products, ice and furniture.

History. Houston was platted and settled in 1836 and was named in honor of Gen. Sam Houston, an American soldier, who helped Texas secure her independence. The city was the capital of the Republic of Texas from 1837 to 1839, when the seat of government was removed to Austin. Annually the city devotes one week of November to a great pageant, or carnival, known as the No-Tsu-Oh Carnival, similar in character to the Mardi Gras of New Orleans. During this period the city gives itself up to gayety and to a civic celebration of extensive proportions enjoyed both by citizens and by a large number of guests. Houston has the commission form of government. Population in 1920, U. S. Census, 138,276.

How'ard, Catharine (1520-1542), fifth wife of Henry VIII, a granddaughter of the second Duke of Norfolk. She married Henry in 1540, within three weeks after he had divorced Anne of Cleves; but in a few months she was accused of immoral conduct, and, following a trial at which her guilt was apparently established, she was beheaded.

Howard, John (1726-1790), an English philanthropist. He hastened to the help of the survivors of the Lisbon earthquake in 1755, and was taken prisoner by the French, but was soon released. While high sheriff for Bedfordshire, he became interested in jail reform and visited the prisons of England and Europe to study how to secure better regulations for prisoners. He died at Kherson in Russia. He wrote *State of the Prisons in England and Wales* and *An Account of the Principal Lazarettos in Europe.*

Howard, Oliver Otis (1830-1909), an American soldier, born in Leeds, Me., and educated at Bowdoin College and at West Point. He served in the Seminole War, for a time instructed in mathematics at West Point, and in June, 1861, took command of the Third Maine Regiment, commanding a brigade at Bull Run. Three months later he became brigadier-general of volunteers. At the Battle of Fair Oaks he lost his right arm, later did conspicuous work at Antietam, Fredericksburg, Chancellorsville and Gettysburg, was efficient in the campaign about Chattanooga and commanded Sherman's right wing in the march to the sea and through the Carolinas. In March, 1865, he was brevetted major-general in the regular army. After the war, General Howard was commissioner of the Freedmen's Bureau until July, 1874. In that year he was assigned to the command of the Department of the Columbia. From 1880 to 1882 he was superintendent at West Point. In 1894 he resigned as major-general, and the following year founded, at Cumberland Gap, Tenn., the Lincoln Memorial University.

Howe, Elias (1819-1867), the inventor of the sewing machine, born at Spencer, Mass. After securing a common school education, he was employed for some time at Lowell, Mass., in a factory for the manufacture of machinery for working cotton. He went from there to Cambridge. While employed

there Howe began to work upon a sewing machine, which he completed and patented after five years. Being without sufficient means to manufacture the machine, and failing to interest capitalists, he went to Europe, but with no better success. Returning, he found others infringing upon his patents and won a suit against them in 1854. Thereafter manufacturers paid him a royalty which afforded him an ample income. He was a private in the Civil War. Howe was decorated with the cross of the Legion of Honor, and received numerous medals.

Howe, Julia Ward (1819-1910), an American author, born in New York City. She married Dr. Samuel Gridley Howe in 1843, assisted him in editing the *Commonwealth* and worked zealously in favor of the abolition of slavery. She was one of the organizers of the American Woman Suffrage Association and the Association for the Advancement of Women, was president of the New England Women's Club and founded the Woman's Peace Association in London. *The Battle Hymn of the Republic* was by far her most popular poem, but all her verse is characterized by a distinct lyric quality. Her works include *Passion Flowers, Modern Society, A Memoir of Dr. Samuel G. Howe, Life of Margaret Fuller* and *Reminiscences.* Her verse is collected in *From Sunset Ridge, Poems, New and Old.*

Howe, Richard, Earl (1726-1799), a British admiral, born in London. When 14 years of age he entered the navy in the *Severn,* which went into the South Seas with Anson, and he next served in the West Indies. Later, during the Jacobite rising of 1745, he was severely wounded in the head in an engagement in the North Sea. As captain of the *Cornwall* he met the Spaniards off Havana, October, 1748, and in 1755 he came to America with Boscawen, serving with distinction. Having been promoted vice-admiral, Howe was put in command of the North America station in 1776 because of his leniency toward the colonial cause. He had several engagements with the French fleet under D'Estaing off Sandy Hook and Newport. In 1782 he distinguished himself by carrying out the final relief of Gibraltar, when the combined fleets of France and Spain refused to accept his offer of battle. He became first lord of admiralty in 1783 and five years later was made an earl. But Howe was still to see the most brilliant service of his career; during the war with France, in 1793, he won the epoch-making victory of the "Glorious First of June."

Howe, Samuel Gridley (1801-1876), "the Cadmus of the Blind," in Whittier's *The Hero,* was born at Boston and educated at Brown University and the Harvard Medical School. Fired by the poems of Byron, he served the Greeks for six years in their struggle for independence. During the succeeding three years he raised more than $60,000 for the relief of the Greek sufferers, wrote his *Historical Sketch of the Greek Revolution,* and became surgeon-general of the Greek fleet. After studying the methods of European institutions for educating the blind, he served from 1832 until his death as superintendent of the first American school for the blind. He was also the founder of the first American school for the feeble-minded. In 1851 he was one of the founders and editor of the Boston *Daily Commonwealth,* an anti-slavery paper, and in this work was assisted by his wife, Julia Ward Howe. See Blind, Education of the; Feeble-Minded, Education of the.

Howe, Sir William (1729-1814), a British general, brother of Richard, Earl Howe. He entered the cavalry in 1746 and by 1757 had become a lieutenant-colonel, in which capacity he served with distinction during the last French and Indian War in America. At the outbreak of the Revolution he was sent, though much against his preferences, to Boston. He led in storming Bunker Hill, was promoted lieutenant-general and succeeded to the chief command of the army. After two successful campaigns and an inactive winter at Philadelphia, which caused an investigation in which he was not censured, Howe re-

signed, May, 1778. In 1793 he became general, two years later governed Berwick-on-Tweed and in 1805 governed Plymouth.

How'ells, William Dean (1837-1920), an American novelist, born at Martin's Ferry, Ohio. In his father's office he learned the printer's trade, and in 1859 was appointed news editor of the *Ohio State Journal.* After serving as consul at Venice he became connected with the New York papers, the *Tribune,* the *Times* and the *Nation.* He was editor-in-chief of the *Atlantic Monthly* from 1872 to 1881, conducted "The Editor's Study" and "The Easy Chair" for *Harper's Magazine* from 1886 to 1892, and edited the *Cosmopolitan* for a short time. In fiction he is the chief American representative of the realistic school. He has a sympathetic understanding of the common people; a favorite and recurring type in his novels is the self-made man. His observations on social and political conditions are keen; his work is characterized by wit, saneness and artistic excellence. He has written *Their Wedding Journey, A Foregone Conclusion, The Rise of Silas Lapham, A Hazard of New Fortunes, A Modern Instance, Out of the Question, Modern Italian Poets, Impressions and Experiences* and *A Boy's Town.*

How'itzer, a cannon longer in proportion to its caliber than a mortar and shorter than a gun. The howitzer is used in connection with infantry in field and siege service. It throws a shell at a high angle and with small muzzle velocity. This enables it to fire over the heads of the infantry and drop its shells into the fort or intrenchments of the enemy. The largest howitzers throw a shell 16½ inches in diameter over five feet long and weighing over 2100 pounds. Their range is from seven to ten miles. See CANNON; ARTILLERY; ARMY.

Howl'er, an American monkey of the Marmoset Family. Members of the family are easily recognized by the presence of a merely rudimentary thumb upon each "hand" and by the possession, by the males of the species, of a greatly enlarged throat, which gives them a bellowing voice audible for two miles or more. They are large, powerful animals, but of low grade of intelligence. In color they are red-brown, brown or black, but the sexes differ in color as they do among the birds. Howlers are killed by the Mexicans and South American Indians for food, and their long hair is used in making cordage. About seven species are known.

Hub'bard, Elbert (1859-1915), an American author and lecturer, born in Bloomington, Ill. He established the Roycroft Shop, in East Aurora, N. Y., for the purpose of reviving interest in old handicrafts, and more especially in the artistic making of books. The *Philistine,* a periodical containing an individual philosophy, was also founded by him. He has published a series of biographies under the title of *Little Journeys,* including the lives of artists, musicians, orators, philosophers and authors. He also wrote *Old John Burroughs, Thomas Jefferson* and *Man of Sorrows.*

Huck'leberry, a shrub of the Heath Family, bearing an edible fruit of the same name. There are many species known, several of which are confounded with the blueberry, a member of an allied genus. The common huckleberry of the swamp is a high shrub having slender, spreading stems, which often attain a height of ten feet or more. The leaves are small and oval or somewhat wedge-shaped and, in the fall, take on beautiful red and orange shades. The flowers are white and bell-shaped, often tinged with pink or marked with pale pink lines. The fruit is a sweet, juicy berry containing a few small seeds; it is blue-black in color, has no bloom and bears upon its apex the remains of the calyx. Low-bush huckleberries grow on low or rocky ground and are only one to three feet in height. The Northern huckleberry is really a blueberry, and is distinguished by the soft, white bloom upon the fruit. Huckleberries grow from New England south and west in almost all of the states except those of the extreme south.

Hudson, Henry (?-1611), English explorer. His first appearance in history is in 1607, when he set sail from London to search for a northeast passage to the Spice Islands. He succeeded in getting north beyond the 80th degree of latitude. On a second voyage in 1608 he reached Nova Zembla. In a third voyage he sailed to the south and discovered the Hudson River in 1609, sailing up to about the point where Albany now stands. In 1610 he made a last effort to find the passage, and discovered the strait and the bay now bearing his name. Here he wintered, but hardship maddened the crew, who, in 1611, set Hudson, his son John and seven faithful followers adrift. Nothing was ever heard of them.

Hudson, N. Y., county seat of Columbia Co., 28 m. s. of Albany on the east bank of the Hudson River, and on the New York Central & Hudson River and the Boston & Albany railroads. A steam ferry plies between this place and Athens, on the west side of the river. It is finely situated on Prospect Hill, which commands a view of the Hudson Valley. Among its noteworthy buildings are the New York State Training School for Girls, Hudson Orphan Asylum, State Volunteer Firemen's Home, state armory and St. Mary's Academy. Hudson was settled as Claverack Landing by New Englanders in 1783. It has extensive manufactories of car wheels, ale, lumber, tobacco, machinery, Portland cement, white goods, etc. Population in 1920, 11,745.

Hudson Bay, a gulf in the northeastern part of Canada. It connects with the Atlantic Ocean through Hudson Strait and with the Arctic Ocean through Fox Channel. The total area is 400,000 sq. m.; its depth, about 70 fathoms. At its north end is Southampton Island; to the south it ends in a prolongation known as James Bay. There are few storms and fogs, and the waters are never entirely ice-locked, but navigation is endangered by floating icebergs and floes. Seal, salmon, whale and walrus are found. The winter months are long and severe. Henry Hudson discovered the bay in 1610.

Hudson River, one of the most important commercial highways in the United States and the largest river of the State of New York, rising in the small lake "Tear of the Clouds" near Mt. Marcy in the Adirondack Mountains. The river crosses the state in a nearly north and south direction and enters New York Bay at the city of New York, separating Manhattan Island from the State of New Jersey. The river at this point is known as the North River and is not a river, but an arm of the sea. The Hudson has a total length of about 350 m. and the tide ascends 150 m. to Troy, which is at the head of navigation. Magnificent steamers ply between Troy, Albany and New York. The largest tributaries are the Mohawk, Hoosic, Wallkill and Sacondaga rivers.

The Hudson River is unrivaled among the rivers of America for picturesque and beautiful scenery. In the first part of its course the river has many rapids, and at Glens Falls there is a fall of about 50 ft. Between this city and Troy the river furnishes vast power for manufacturing purposes. Below Newburgh the river passes through the beautiful Highlands of the Hudson, whose peaks rise abruptly to a height of 1000 to 1600 ft. Tappan and Haverstraw bays are expanded parts of the river, the former bay being about 4 m. wide and 13 m. long. At Piermont, where the river again contracts, the Palisades, 300 to 500 ft. in height, rise picturesquely on the west bank and extend for 20 m., the opposite bank being dotted with towns and cities. The river derives its name from Henry Hudson, who sailed to the mouth of the Mohawk, at Cohoes, in September, 1609. The Indian name for the river was Shatemuc. The Hudson has always occupied an important position in the historical as well as the commercial life of the nation, and is fittingly called the "Rhine of America."

Hudson's Bay Company, an English trading company organized in 1670 for the purpose of trading in furs in the

region around Hudson Bay. For nearly a century the company suffered from the conflicts between the French and English and made little progress. When the French relinquished their claims in North America to the English, the company began to prosper and to extend its influence. By 1856 it had over 3000 employees and was practically responsible for the administration of law in all the British Northwest. It exerted a powerful influence in the political affairs of Canada. But when the Dominion was formed in 1867, settlers began to invade the company's domain, and in 1869 it sold its territory to the Dominion.

Huerta, Victoriano, *Vic tor ri ahn' no Whert' tah.* See MEXICO, subhead *History.*

Hugh Capet, *Hu Ka' pet.* See CAPETIAN DYNASTY.

Hughes, *Hewz,* **Charles Evans** (1861-), an American jurist and statesman, born at Glens Falls, N. Y. He studied at Brown and Colgate universities and Columbia Law School. He became professor of law in Cornell University in 1891, and afterwards lecturer in the New York Law School. He first came into public notice as counsel for the Legislative Committee of New York in their investigation of certain gas, electric-light and insurance companies. He was governor of New York State for four years, beginning in 1906. In 1910 he was appointed associate justice of the United States Supreme Court. Being nominated for president by the Republican National Convention in 1916, he resigned from the bench, and when defeated in the election he resumed the practice of his profession. He entered President Harding's cabinet as Secretary of State in 1921.

Hughes, James Laughlin (1846-), a Canadian educator. He was born near Bowmanville, Ontario, and educated at the Toronto Normal School, where he became an assistant in the model school at the age of 20. He was influential in the establishment of kindergartens in Ontario, in 1893 was chairman of the elementary department in the World's Congress of Education at Chicago, and is widely known as a lecturer on educational subjects. His works include *Dickens as an Educator, The Practical Speller* and a *Topical History of England.*

Hughes, John (1797-1864), first Archbishop of New York, born at Annaloghan, Ireland. His father emigrated to the United States in 1816 and settled in Pennsylvania. After coming to America the son was placed in Mount St. Mary's College, Emmitsburg, Md., to study for the priesthood. He was ordained in 1826, and his remarkable powers first attracted widespread attention and admiration when he engaged in a controversy with a distinguished Presbyterian clergyman, Rev. J. A. Breckenridge. In 1838 he was consecrated Bishop of Basileopulis and coadjutor of New York. He was raised to the dignity of Archbishop of New York in July, 1850. Archbishop Hughes abolished trusteeism in the New York Diocese, in 1841 he brought about the overthrow of the Public School Society which he thought was undermining the religion of the children, and later founded the Catholic School system now existing in New York. At the outbreak of the Civil War, although not an Abolitionist, he boldly sustained the Union cause, and was intrusted with an important mission to the court of Napoleon III, and probably dissuaded him from recognizing the Confederacy. He was a staunch supporter of the Holy See in its trouble with the Italian Government, raising a fund of $53,000 as an offering from his diocese to the Pope.

Hughes, Samuel (1853-1921), a Canadian legislator, born in Ontario and educated at Toronto University and at the Royal Military Schools. He lectured for ten years in Toronto College Institute, on English language, literature and history, and in 1885 turned his attention entirely to journalism, being editor and proprietor of the Lindsay *Warder* from then until 1897. Having entered the volunteer militia, he became lieutenant-colonel by 1897, and, after serving with distinction in the South African War, 1899-1900, he was pro-

moted colonel, 1902. A Conservative, he sat for North Victoria in the House of Commons from 1892 to 1904, and after that he represented Victoria and Haliburton. In October, 1911, he entered the Borden cabinet as minister of militia and defense.

Hughes, Thomas (1823-1896), an English author, born in Uffington. He studied at Rugby under Dr. Thomas Arnold, graduated at Oxford in 1845, was admitted to the bar three years later and became queen's counsel in 1869. In 1880 he established Rugby, a socialistic community in Tennessee. He became famous as an author in 1856 with the appearance of *Tom Brown's School Days,* a truthful delineation of life in English public schools. Among his other works are *Tom Brown at Oxford, The Scouring of the White Horse, Life of Alfred the Great* and an edition of Lowell's *Biglow Papers.*

Hugli, *Hoo' gle,* **River,** the principal delta channel of the Ganges River, formed by the junction of the three offsets (known as the Nadiya rivers), the Churni, the Jalangi and the Bhagirathi. It is 125 m. long, with an additional estuary 35 m. in length, and is available for navigation, though under the influence of the southwest monsoon and frequently encumbered at its entrance by large shoals.

Hu'go, Victor Marie (1802-1885), a French dramatist, poet and novelist, born at Besançon. He was brought up a Royalist and a Catholic, and studied at Paris and Madrid. At 17 he had competed for and won several prizes, and at the age of 20 he published a volume of odes, where he gave expression to his youthful religious and political enthusiasm. In 1827 appeared the dramatic poem *Cromwell,* with the preface in which he made his celebrated defense of the theories of the Romanticists. Three years later the drama *Hernani* was presented, and for nearly 100 nights the violent protests of the Classicists vied with the stormy applause from the enthusiastic supporters of the new school. There was a burst of such intense emotion expressed in the play as the theatergoers of the period had never witnessed before. In the same vein of spontaneity and freedom he produced the daring dramas *The King Amuses Himself, Lucrèce Borgia, Marie Tudor* and *Ruy Blas,* the last a triumphant combination of tragedy and high comedy, written in noble verse. In 1843 when *The Burgraves* was written, it became apparent that the author had conceived situations too grandiose for the limitations of the drama, and he gave up the work, turning his attention to politics.

In 1841 he became a member of the French Academy and was made a peer by Louis Philippe four years later. When the Revolution of 1848 broke out, he supported Louis Napoleon, until Napoleon no longer favored his advancement. Then he withdrew, joined the Democratic Party, but was distrusted by his fellow Republicans and forced to flee to Brussels and England, where he remained in exile for about 20 years. In the books *Napoleon the Little* and *History of a Crime* his indignation is at white heat as he recalls how the Second Empire was founded. In 1871 he became a member of the National Assembly at Bordeaux; resigning, he went to Brussels, where his defense of the Paris Commune brought about threatened mobs, and he was expelled from Belgium.

From 1853 Hugo wrote chiefly fiction, only one of his larger novels, *Notre-Dame de Paris,* having previously appeared. *Les Misérables,* completed in 1862, was published in ten different languages on the same day. It is the greatest epic and dramatic work of fiction that has ever been produced. The story of a soul ennobled and glorified by suffering, it presents an alternating panorama of sunlight and gloom, and although it had practically no influence on the development of fiction as such, its popularity remained unwaning for several succeeding decades. Other novels, revealing man in his blind struggle with fate and environment, are *The Man Who Laughs, Toilers of the Sea* and *Ninety-three.*

Among his other works are *The Chastisements,* a series of poems bearing on the joys and sorrows of youth, the inexpressible loss of a loved daughter and the pains of exile, and *The Legend of the Centuries,* an epic which in sublimity and beauty rivals the splendor of even Dante and Milton. In 1864 he published *William Shakespeare,* in which eloquence runs riot as he pays homage to the bard of the 16th century. Hugo was first and last a lyricist and ranks as the greatest French poet of his century, as well as one among the greatest of all time.

Huguenots, *Hu' ge nots,* a name given to the French Protestants during the 15th and 16th centuries. The name, said to have been derived from that of King Hugo, at whose gate the Protestants met nightly, was applied to Protestants in much the same way as the term *papist* was given to the Catholics. The edict aiming at the extermination of the heretics in 1535 had caused many Protestants to emigrate, and in 1538 the first French Protestant church was established at Strassburg with the famous John Calvin as its pastor (See CALVIN, JOHN). About this same time, in spite of great opposition, the Church of Paris was organized, and a union of all Protestant churches in the kingdom was attempted. In 1559 the Synod of Paris was called to consider the constitution of Calvin; this synod gave its form as its name to like assemblies of the later-organized Presbyterian Church. The Huguenots had by this time attained considerable strength in France and numbered among their members such influential people as Coligny, the Estiennes and Jeanne d'Albret, the mother of Henry of Navarre. With such assistance the Huguenots were enabled to form a political party, which was opposed by the House of Guise, the leaders of the Catholic Party. The contests between the parties became as much political as they were religious, from this time, and resulted in a series of religious civil wars. After the massacre of St. Bartholomew's Day (1572) the Protestants that remained fled to their fortified towns, where after sieges and determined opposition war was temporarily terminated. The Huguenots, though accused of an attempt to set up a government of their own, were at heart Royalists, and the little republic which they instituted was rather religious than civil. Of this republic the Prince of Condé was the first president, and later Henry of Navarre headed it until he became King of France. The accession of Henry IV to the throne of France filled the Huguenots with a hope which was temporarily extinguished when Henry acknowledged the Catholic faith (See HENRY IV), but was rewarded by the Edict of Nantes (See NANTES, EDICT OF) in 1598, allowing religious liberty to Protestants.

During the following years in the reign of Louis XIV the Edict was revoked, and such persecutions of Protestants ensued that the Huguenots were driven in numbers to the New World, where their settlements in Nova Scotia, along the St. Lawrence, in South Carolina and along the Gulf hastened colonization. The Code Napoleon enacted in the 19th century placed Protestants and Catholics upon an equality in France. See LAW, subhead *Code Napoleon.*

Hull, a city of Canada in the Province of Quebec, on the Ottawa River and the Canadian Pacific Railway, 2 m. n. of Ottawa. It lies directly opposite the latter city and is connected with it by an electric tram and two large bridges. The city contains saw and planing mills, Portland cement works, a foundry, a packing house and factories for the production of paper, matches, sulphur, sulphite, woodenware, bricks, furniture and axes. There are important mines of phosphate rock, mica and iron in the vicinity, and the falls in the Chaudière River opposite the city constitute one of the finest cataracts in Canada. Population in 1911, 18,222.

Hull, or **Kingston-upon-Hull,** a seaport, civic, county, Parliamentary and municipal borough in East Riding, Yorkshire, England. The town is about 40 m. by rail s.e. of York and 20 m. from

the North Sea. The surroundings are uninteresting and far from picturesque, and the old quarter of the town, forming an irregular peninsula, is very crowded. Among prominent buildings are Trinity Church, the corn exchange, the new exchange, the Hull and East Riding College, the Royal Institution and numerous other educational establishments. It is the third port in importance in the kingdom. The exports include coal, machinery, oil, woolen and cotton goods and mill work; the imports, timber, wool, flax, hemp, tallow, cattle and grain. The docks, among the largest in the world, cover 200 acres. After the Norman Conquest the town rapidly developed into a port of importance, and in 1298 it received its charter from Edward I. Population, about 259,000.

Hull, Isaac (1773-1843), an American naval officer, born in Derby, Conn. He was commissioned lieutenant in the United States navy in 1798, commanded the *Argus* in 1804, engaged in the Barbary Wars and was given command of the *Constitution,* with which he successfully evaded an attack by a superior British force at the outbreak of the War of 1812. Off Newfoundland he soon afterwards captured the British frigate *Guerrière,* losing 14 men to the enemy's 72. This was the first and most famous naval victory during the war. See CONSTITUTION, THE.

Hull, William (1753-1825), an American soldier, born in Derby, Conn., and educated at Yale. Becoming captain of a Connecticut regiment at the outbreak of the Revolution, he fought at White Plains, Trenton, Princeton, Saratoga, Ft. Stanwix, Monmouth and Stony Point. After the war he became a state senator and from 1805 to 1812 he was governor of Michigan Territory. In the latter year, when the second war with England opened, as a brigadier-general he was placed in command of the Northwestern army, with headquarters at Detroit. Hull exhibited inferior ability and failed to inspire the confidence of his troops, and finally surrendered Detroit—and all Michigan Territory—to the British on Aug. 16. He was court-martialed and sentenced to death for cowardice; but he was pardoned by Madison in consideration of his Revolutionary services.

Hull House. See SOCIAL SETTLEMENTS.

Hum'bert I (1844-1900), King of Italy and successor of Victor Emmanuel II. In January, 1878, he succeeded to the throne of Italy and ruled carefully according to constitutional law. In his foreign policy he was anxious to take an active part in European affairs, and for this reason he entered into a Triple Alliance with Germany and Austria. He earned the title of "Humbert the Good" by his lavish charity and his courage in the rescue work after the earthquake at Ischia in 1883 and during the cholera epidemic of 1884. After two unsuccessful attempts upon his life he was shot and killed near Milan by an anarchist.

Hum'boldt, Alexander, BARON VON (1769-1859), a German naturalist, born at Berlin, and educated in the universities of Frankfort-on-the-Oder, Berlin and Göttingen, and at the academy in Hamburg. He also studied in the school of mining in Freiberg, and had the oversight of the Franconian mines. During his lifetime Humboldt visited South America, Mexico, the West Indies, Siberia, central Asia and the countries of southern Europe. He was the leading geographer of his time and his books were widely read, especially *Kosmos,* which is still regarded as a standard work.

Hume, David (1711-1776), an English historian and philosopher, born in Edinburgh, the youngest son of the laird of Ninewells. His education consisted chiefly in home reading, although he appears to have attended the University of Edinburgh when 12 years old. He studied law and engaged in mercantile affairs for a time, but soon abandoned both for the "pursuits of philosophy and learning," to which he gave his life with much devotion. He spent three years in retirement in France (1734-1737), and wrote his *Treatise of Human Nature.*

Now regarded as one of the three or four most famous philosophical works of England, it attracted almost no attention at the time of its publication. Turning then to political theory, Hume published *Essays, Moral and Political* (and *Literary,* added later).

In 1748 he recast his earlier work in the *Enquiry Concerning Human Understanding;* in 1751 he published *Enquiry Concerning the Principles of Morals;* and in 1752 appeared the *Political Discourses,* which have been called the "cradle of political economy." At the same time he also wrote *Dialogues on Natural Religion,* published after his death. From 1754 to 1762 he published the various parts of his *History of England,* which immediately became a classic. When he went to France in 1763 as a member of the English embassy, he found himself famous there, and was much lionized. After his return to England four years later he became undersecretary of state. In 1770 he retired to Edinburgh, where he died in 1776.

Hume's literary style is delightful, full of sparkle and animation. His essays are models of their kind. His historical writing is clear and forceful in narration, and philosophical in breadth and judgment. As a philosopher he carried the empirical school to its logical conclusion in universal skepticism. Locke and Berkeley had both retained the conception of a mental substance which received impressions through the senses. Hume drops this out, and identifies the mind with the series of impressions itself. When the impressions cease, the mind therefore ceases. This does away with the permanent Ego, or self, and with any possibility of immortality. Hume therefore early gained a reputation for heresy, agnosticism and skepticism. The conclusions of his philosophy aroused Kant from his "dogmatic slumber," and opened the way for further progress in philosophical thought.

Humid'ity, the water vapor in the atmosphere. This vapor is an invisible and light-weight gas, constituting five per cent of the atmosphere of the earth.

It is not uniformly distributed, however, and the amount in certain localities is greatly in excess of that in others. The interchange of water between the ocean and the land and between different parts of the land and sea is constantly going on; and when account is taken of the large volumes of water which are continually being emptied into the sea by rivers, and the large amount which is otherwise returned to its source, and it is considered that the atmosphere is the chief medium of exchange for all this moisture, the amount of water which is constantly in transit is almost incredible.

The chief means of water circulation are evaporation, diffusion and precipitation. By evaporation liquid water is changed to water vapor, in which form it is carried upward by ascending warm currents until it becomes chilled to the dew point, at which it is condensed, or changed back again to water, forming clouds. The rate of evaporation is conditioned by the amount of water vapor already in the air, by the relative temperature of the water and the overlying air and by the strength of the wind. The amount of water vapor in the atmosphere varies greatly with temperature and with locality. When the air contains the largest possible percentage of water vapor, it is said to be saturated. The amount of moisture which any given mass of air contains is its absolute humidity. Relative humidity is the ratio of the absolute humidity and the quantity of vapor the air could hold if saturated. Thus if the air contains half the moisture required to saturate it, its relative humidity is 50; if three-fourths, it is 75. The average relative humidity over the land is about 60; over the ocean, 85. The higher the temperature the more moisture is required to saturate the air. That part of the United States where the land is agriculturally productive without irrigation is that portion where the relative humidity is 65. The United States is almost equally divided into an eastern humid and a western dry region, although there are limited areas of great humidity along the Pacific coast.

Hum'ming Bird, a family of birds found only in North and South America and the islands near the coasts of these continents. The name is given them because of the sound produced by the rapid vibration of their wings when in flight or poised about flowers in search of food. There are between 400 and 500 species, over 17 of which are found in the United States.

Humming birds are the smallest and most beautiful of all birds. They range in size from nine inches in length to a tiny creature less than two inches long, which is often compared in size to a large bumblebee. The bill is slender and usually straight. It varies in length from one-fourth of an inch in the smallest species to five inches in the largest.

In color humming birds are usually brilliant, with metallic hues of green, red, blue and crimson. The most conspicuous color is on the throat, which is usually marked with green, gold, ruby or some other bright color. In a number of species the sexes are colored alike, but in two-thirds of the species the males are much more brightly colored, and in only one species is the female brighter than the male. The tail feathers are usually brilliant and vary in length and form, being square, round, forked or having a threadlike shaft with only a tuft at the end.

The nest is a beautiful structure, made of fine plant down, lined with spiders' webs and completely hidden by lichens which have been cleverly attached to the outside. The nest is usually saddled on a limb, but it may be attached to sides of rocks or to the tip end of leaves. Two white eggs are laid. The food consists largely of insects and, to a limited extent, the nectar of flowers. The tongue of the humming bird is divided nearly its entire length so that it somewhat resembles two fingers. When extended from the bill, it can reach the nectar in the bottom of the flower cup or seize upon insects which may be captured within the flower or taken upon the wing.

The young are fed by partially digested food which the mother raises from her stomach and places in their bills.

Hundred Years' War, is the name of the long conflict between England and France lasting with intermissions from 1337 to 1453, being an attempt on the part of England to obtain rule over France. Edward III of England claimed the throne because his mother was sister to Charles IV of France. During this long conflict success veered back and forth between the two countries. In 1420 England as the result of the great victory at Agincourt (which see) seemed to be successful in the conflict since their king, Henry V was acknowledged as heir to the French King, Charles VI. Then came the strange episode of Joan of Arc (which see), and England finally relinquished her long-standing claim. The battle of Creecy 1346 resulting in a great English victory is regarded as one of the great battles of history. (See CREECY, BATTLE OF.)

The most important effect of this war upon England was to increase the power of the House of Commons. It also tended to awaken a national spirit and to fuse the Normans and Saxons into one people, the English.

Hungary. An independent nation of Europe bounded on the north by Slovakia, on the east by Transylvania, on the south by Jugo-Slavia, on the west by Austria. Its estimated area is about 58,000 sq. mi. or about that of our state of Florida. Its estimated population is about 11,000,000. The boundaries of Hungary were arranged by the Treaty of Paris at the conclusion of the World War, subsequently slightly modified by a separate treaty with Roumania. Present Hungary includes those parts of the old kingdom of Hungary that are distinctly Magyar in ethnology. It lost its old Slovak counties to the north of the Hungarian plains, Transylvania to the east, strongly Roumanian; and its Slavic provinces (Croatia and Slovania) to the southwest, and a large part of the Bairat along the Danube.

The greater portion of Hungary consists of two immense plains known re-

spectively as the Little and Great Hungarian Plains. The Little Plain lies along both sides of the Danube from Pressburg to Gran, where the river suddenly turns south. There are large marshes along the river. The average elevation is about 450 feet. The Great Plain of Hungary in many respects reminds the traveler of the Western Plains of the United States. It sweeps from Slovakia on the north to the Danube in the south. In area it is about 45,000 sq. mi. The average elevation is 325 feet. The surface slopes slightly to the south. Low hills with swampy hollows are the only variation. Trees seldom break the surface line except at villages. The Theiss River taking its rise in Slovakia, pursues its lazy course across the plain, parallel to the Danube, into which it empties when that river resumes its eastern flow along the southern boundary of Hungary.

AGRICULTURE. In general, those plains are very fertile, and have been celebrated in that respect since Roman times. It was the lure of this fertile plain that deflected the Hunnish tribes, under the lead of Attila and induced them to settle there. Their example was followed in after centuries by their Magyar kindred coming up the Danube and thus explains this strange ethnic island in the midst of Slavic surroundings.

Of necessity agriculture is the main industry of Hungary. The climate is temperate, the rainfall in general sufficient—though seasons of great drought occur—and all the cereal crops of the temperate zone flourish. Immense herds of cattle, sheep and horses are to be found. Reminiscent of tribal customs is the immense number of small farms—averaging about two and a half acres—with occasional vast estates. It is on the Great Plain of Hungary with its level expanse, its boundless fields and wide spreading villages, and the picturesque types of peasants, that one finds the real Hungary and the real Hungarian people rather than in its cosmopolitan capital of Budapest.

HISTORY. (See AUSTRIA-HUNGARY.)

Huns, The. A Finno-Altaic people originally located on the Trans-Caspian plains of Asia. In the fourth century of our era, they suddenly invaded Europe as a resistless desolating barbaric host overthrowing civilized people wherever they passed, finally settling on the plains of Hungary and founding Budas, their capital, which city as Budapest, is still the capital of Hungary. This invasion marks the beginning of the Dark Ages in History. (See ATTILA.) (Also HUNGARY.)

Hunt (James Henry) Leigh (1784-1859), an English journalist, essayist and critic, born in Southgate. He studied at Christ's Hospital, London, was clerk in the war office and later became editor of the newspaper, the *Examiner*. His bold attacks on the policies of the Tory government led to imprisonment, but while serving his two years' sentence he continued to write political and literary essays. He met Shelley, Keats and Byron, and was induced by the latter to go to Italy and manage the *Liberal*, a political and literary journal; but he returned to England in 1825. A long struggle with poverty and sickness followed, until he was granted a civil pension in 1847, when his relief from care and want was reflected in the charming volumes that soon appeared. His poetry is bright and animated; his criticism, appreciative and discriminating. A lightness and sweetness about his essays make them popular and widely read. He wrote *Imagination and Fancy, Stories of the Italian Poets, Table Talk, The Story of Rimini, Wit and Humour, Autobiography, Legend of Florence* and *Stories in Verse*. Of his shorter poems, *Abou Ben Adhem* is still a favorite.

Hunt, William Holman (1827-1910), an English painter. Having acquired some skill in art during leisure hours, he opened a studio at the age of 16. A short time afterwards he entered the Royal Academy Schools, and exhibited in the Academy in 1846. In the year 1848 Hunt and Millais, with a few others, initaited the Pre-Raphaelite movement. Hunt occupies a unique place among English artists. His idealism is

shown in such works as his *Light of the World* and *Isabella and the Pot of Basil;* others that have won wide recognition are *The Scapegoat, The Flight into Egypt* and the portrait *Dante Gabriel Rossetti.* See MILLAIS, SIR JOHN EVERETT.

Hunter, David (1802-1886), an American soldier, born in Washington, D. C., and educated at West Point. He saw service during the war with Mexico, and was appointed colonel of cavalry in May, 1861. He was seriously wounded at the first Battle of Bull Run. As major-general of volunteers he served in Missouri under Fremont, whom he superseded, and early in 1862 was placed in command of the Department of the South. He immediately declared martial law in his department and began to organize regiments of colored troops. He issued an order in April, 1862, abolishing slavery in Georgia, Florida and South Carolina. But this step was too radical for the times, and Lincoln annulled the order. Subsequently Hunter served in West Virginia and Virginia and was brevetted major-general in the regular army, retiring in 1866.

Huntington, Ind., a city and county seat of Huntington Co., 24 m. s.w. of Ft. Wayne and 70 m. s.e. of South Bend, on the Little River, 1 m. from its entrance into the Wabash, and on the Erie, the Wabash and other railroads. It has an important trade in farm products and in coal and lime from the near-by coal fields and lime kilns. The river affords abundant water power for manufacturing purposes. The city has manufactories of pianos, headings and handles, boots and shoes, plows, cement, bicycles, barrels and wood and foundry products. Railroad repair shops are located here. Huntington is the seat of the United Brethren College. There is a public library. Population in 1920, 14,000.

Huntington, N. Y., a township of Suffolk Co., Long Island, on Long Island Sound and on the Long Island Railroad. The villages of Huntington, Cold Spring Harbor, Northport and Centreport, which lie along the Sound, are favorite residential suburbs, and there are many fine residences owned by New York City business men. Northport, the most easterly of the villages, contains a population (1910 census) of 2096. The village contains shipbuilding yards, valuable oyster fisheries and a large law publishing house. The New York State Fish Hatchery, the Biological Laboratory of the Brooklyn Institute of Arts and Sciences, and a laboratory of the Carnegie Institution are located in the village of Cold Spring Harbor. Huntington has a large summer colony and is a prominent resort. The southern part of the township is largely given over to market gardening, and the city manufactures include brick, pottery and dairy products. The first settlement was made in 1653 and the early settlers were nearly all Puritans from England. A huge boulder on the shore of Huntington Bay, an indentation of the Sound, marks the place of capture of Nathan Hale by the British on Sept. 21, 1776. Walt Whitman was born near Huntington. Population of the township in 1920, 13,893.

Huntington, W. Va., the county seat of Cabell Co., located on the Ohio River just below the entrance of the Guyandotte River and on the Baltimore & Ohio, the Chesapeake & Ohio and other railroads. Huntington is conveniently situated in the center of a magnificent lumber, coal and gas region. Huntington is built upon a broad plateau along the Ohio, and its broad paved streets, laid out in regular arrangement, are lined with spacious residences or modern business blocks. The city has two amusement parks, one of which, Camden Park, lies four miles out and includes a large lake and natural spots of great beauty. Within the city limits are several parks, and space is reserved for a wider park system as the growth of the city demands it.

Huntington has many handsome churches, a large county courthouse, a modern Federal Building, a Carnegie library and several fine hotels. Near the city is the West Virginia Asylum, with its spacious shaded grounds. Marshall

College, which is a state normal and an academic school, is located here, as also are two Catholic schools, St. Edward's Preparatory College and the school of the Sisters of St. Joseph. The public school system is an excellent one, and the numerous school buildings are well equipped. Aside from these there are several private schools of high grade.

Among the manufactures are woolen goods, cars, furniture, china, shoes, agricultural implements, woodenware, cement, leather goods, auto supplies, steam boilers, blank books, stoves, machinery and glass. The city was settled and incorporated in 1871. It received its name in honor of the late Collis P. Huntington, through whose influence the site was selected. It has had a phenomenal growth, having become within a decade the second city of the state in size and commercial importance. It has the commission form of government. Population in 1920, 50,171.

Huntsville, Ala., a city and the county seat of Madison Co., 111 m. n. of Birmingham, on the Southern, the Nashville, Chattanooga & St. Louis and other railroads. Huntsville is an important market for agricultural produce, and in the manufacture of cotton products it leads all other cities in this section. Besides the cotton industry there are numerous other industries, in connection with which are operated saw and planing mills, brick plants, machine shops, foundries, spoke and handle factories, hoop and heading factories, a fiber factory and other manufactories. The city has an unrivaled water supply, derived from a spring which has a flow of 2,500,000 gallons daily. The Central Alabama Academy is located here, and at Normal, three miles distant, is the Alabama State Agricultural and Mechanical College for negroes. Huntsville was settled in 1805 by John Hunt, a soldier of the Revolution. In 1819 the convention that framed the first Alabama constitution met here. It was the first capital of the state. The place was chartered as a city in 1844, revised in 1897. In the course of the Civil War Huntsville was twice seized by Federal forces (1862-63). Population in 1920, 8,018.

Hur'dy-Gur"dy, a box-shaped musical instrument of medieval origin. Within the box were four strings which were played upon by a wheel covered with resin, which, when turned from the outside by a handle, acted upon the strings like a bow; the pitch was regulated by a series of keys. The instrument at present designated as a hurdy-gurdy is so constructed that the handle is attached to a rotating cylinder, covered with pegs, which strike the strings or keys, or produce vibration by pressure upon air valves or pipes. It is frequently a combination of piano, hand organ and drum.

Hu'ron. See WY'ANDOT.

Huron, S. D., a city and county seat of Beadle Co., 119 m. n.e. of Pierre and 115 m. n.w. of Yankton, on the Great Northern and the Chicago & North Western railroads. Huron is the seat of Huron College (Presbyterian). There is also an excellent system of public schools. There are manufactories of flour, brick, wagons and carriages and dairy products. Large railroad repair shops, machine shops, packing plants and elevators are located here. The city has had a rapid growth. Huron is operated under the commission form of government. Population in 1920, 8,302.

Huron, Lake, the third of the Great Lakes in area. It separates the Province of Ontario, Canada, from the Lower Peninsula of Michigan, and connects with Lake Michigan by means of the Straits of Mackinac, with Lake Superior by means of St. Mary's River and with Lake Erie by means of the Detroit and St. Clair rivers and Lake St. Clair. Georgian Bay is a large arm of the lake at the east and is separated from it by the Manitoulin Islands and the Bruce Peninsula (See GEORGIAN BAY; MANITOULIN ISLANDS). On the western side, Saginaw Bay forms an important arm 60 m. long and 20 m. broad, extending southwestward into Michigan. Lake Huron is 270 m. long, 105 m. broad at its widest part, and its area is approximately

23,000 sq. m. It is deeper than Lake Superior, but not so deep as Lake Michigan; its greatest depth is 1000 ft. It lies 574 ft. above sea level and is, therefore, 26 ft. below Lake Superior and 4 ft. below Lake Michigan. The fall between it and Lake Erie is a gradual one of 10 ft. The shores at the south are low, but from Goderich north on the Canadian shore the cliffs are high and rugged. The water is clear and quantities of trout and pickerel are caught. The principal American ports are Cheboygan, Alpena and Port Huron; the principal Canadian ports are Goderich, Kincardine and Southampton. The important rivers entering the lake are: from Michigan, the Saginaw, the Cheboygan and the Au Sable; from Ontario, the French and the Maganetawan.

Hur'ricane, a violent windstorm which usually is accompanied by electric manifestations and by hail. Storms to which this name is applied are of the whirlwind type and generally occur in tropical regions; those that occur in the West Indies and the China Sea are often spoken of as typhoons and are most frequent in the months of August, September and October. The hurricane is a windstorm of the strongest force. See STORM; CYCLONE.

Husband and Wife, a man and woman married to each other. The law recognizes the rights of married persons in their relation to each other under personal rights and property rights. These rights were first fixed by common law, which in the United States was long since recognized as being unjust to the wife. The first modification of common-law rights of the wife was made by the State of New York, in 1848. Other states immediately followed the example of New York, and in most states the wife now has equal rights with the husband.

PERSONAL RIGHTS. The following personal rights are generally recognized:

1. The husband has the right to determine the place of residence, and the wife's legal residence is identical with his.

2. The husband is bound to support the wife in circumstances conformable to his income and social position.

3. The wife is bound to care for the home, and in so far as services to this end are required, they belong to the husband.

4. Husband and wife cannot be witness in a case where the other is a party, except in certain cases brought by one against the other.

5. The husband is liable for civil offenses committed by the wife after marriage.

PROPERTY RIGHTS. 1. At marriage the wife secures a dower interest amounting to one-third the husband's estate.

2. In most states the wife may hold and convey property in her own name, but she cannot convey her husband's estate by will or otherwise.

3. The wife cannot make contracts in her husband's name unless acting as his authorized agent.

4. The husband cannot convey real estate without the wife's consent because of her dowry in the same.

5. The wife can contract debts for her necessary support, which the husband must pay. See DIVORCE; MARRIAGE.

Huss, John (about 1370-1415), a Bohemian reformer. While studying at the University of Prague, he became converted to the doctrines of Wiclif, and in 1402, as rector of the university, he began to spread these doctrines by preaching in the Bohemian tongue. Six years later he was forbidden to preach, but he was supported by the King of Bohemia, and the people regarded him as a hero. He was excommunicated in 1410, and spent his retirement in writing his chief work, *On the Church.* In 1414 he was summoned to attend the Council of Constance, where he was imprisoned and tried for heresy; upon his refusal to recant, he was burned at the stake in July, 1415.

Hutch'inson, Anne (about 1590-1643), a religious enthusiast of colonial times, born in Lincolnshire, England. She married William Hutchinson, and in 1634 came to Boston, Mass., where she was soon accused of teaching heresy. She

was publicly examined, excommunicated and exiled. With followers she went to Rhode Island and founded Portsmouth and Newport. Later, Mrs. Hutchinson went to Long Island, where she and her family, excepting one daughter, were massacred by Indians.

Hutchinson, Kan., a city and the county seat of Reno Co., 40 m. w. of Wichita, on the north side of the Arkansas River and on the Missouri Pacific, the Chicago, Rock Island & Pacific, the Atchison, Topeka & Santa Fe and other railroads. Indian corn, wheat and other farm products are extensively raised, and there is a large wholesale trade. Large deposits of rock salt are found in the vicinity and underlie the city, and one of the largest salt plants in the world is located here, having a daily output of about 6000 barrels. Natural gas is largely used for fuel. Other manufactures include soda ash, flour, strawboard, butter and creamery products, sash, blinds and doors and planing-mill products. Among the noteworthy buildings are a county courthouse, Federal Building, a public library, numerous churches, banks and substantial business houses. An industrial reformatory is maintained here by the state. There are several public parks. Settled in 1871, Hutchinson was incorporated in 1872 and in the same year chartered as a city. The commission form of government has been adopted. Population in 1920, U. S. Census, 23,298.

Hutchinson, Thomas (1711-1780), the last royal governor of Massachusetts, born in Boston, and educated at Harvard. He early became interested in politics, served several terms in the Colonial Assembly, became lieutenant-governor of the colony in 1758, was made chief justice of the state in 1760 and was commissioned royal governor in 1770. A courageous and determined Loyalist, he became very unpopular as the independence sentiment grew. When military law was declared in 1774 he went to England to reside. His *History of Massachusetts Bay* is a work of great value.

Huxley, Thomas Henry (1825-1895), a noted English scientist, born in Ealing, a suburb of London. He studied in the Medical School of Charing Cross Hospital, and in 1845 graduated at the University of London. Entering the medical service of the navy, he was appointed in 1846 assistant surgeon of the *Rattlesnake,* which was to make surveys to the east and north of Australia. The voyage lasted four years, and during this time Huxley devoted himself with great enthusiasm to the study of marine animals, writing scientific articles home to the Linnæan and Royal societies. When he returned to London he found himself famous. He was given his time with salary for three years to work up the material which he had collected during the voyage. The result was his famous book, published in 1859, *Oceanic Hydrozoa.*

Meantime he had been elected a fellow of the Royal Society in 1851, and in 1854 he was made professor of natural history in the Royal School of Mines. His ability as an educator, coupled with his success in original research, opened to him important positions and brought him many honors. He served as Fullerian professor of physiology to the Royal Institution; was for seven years examiner to the University of London; filled the Hunterian professorship in the Royal College of Surgeons; and in 1883 received the highest scientific recognition possible by being elected president of the Royal Society. He was also an honored member of other scientific societies, served on ten royal commissions, became lord rector of Aberdeen University, and in 1892 was made a member of the Privy Council. Because of ill health he retired from his various positions in 1885 and spent the remaining ten years of his life in writing.

While Huxley was an original investigator of unusual ability, yet his services were probably greatest in the direction of popularizing the results of science. He had remarkable facility of expression, a style that was clear, forceful and interesting. His writings are

good science, but good literature also; while as a public speaker he was able to present scientific topics in a form that was understood and appreciated by the uneducated. Among his most important writings, aside from his many magazine contributions, are *Oceanic Hydrozoa, Evidence as to Man's Place in Nature, Elementary Physiology, Elementary Biology* (with Martin), *Anatomy of Vertebrated Animals, Anatomy of Invertebrated Animals, Physiography* and *The Crayfish.*

Hyacinth, *Hī″ a sinth,* a cultivated member of the Lily Family, which bears a stalk of purple, pink or white flowers early in spring. The leaves are stemless and rushlike, springing from a bulb; the flowers are bell-shaped and heavily scented. The grape hyacinth, cultivated from Europe, is a small garden or dooryard plant, with a closely crowded spike of deep blue spherical flowers resembling a bunch of grapes. These flowers are scentless.

Hyacinthe, *Ē″ a″ sant′,* **Père.** See LOYSON, CHARLES.

Hy″acin′thus, a Greek youth whom Apollo passionately loved. While playing quoits together, the discus thrown by the god accidentally hit Hyacinthus on the forehead. Apollo, grief stricken, was unable to save the life of his friend; but as the blood flowed from the dying boy's wound and stained the herbage, it ceased to be blood and became a flower. Apollo had changed it into the beautiful purple hyacinth.

Hyde Park, Mass., a town of Norfolk Co., 8 m. s.w. of Boston, on the Neponset River and on the New York, New Haven & Hartford Railroad. The villages included within the town limits are Clarendon Hills, Fairmount, Readville and Hazlewood. It is a residential suburb for many business men of Boston. There are extensive manufactories of rubber goods, looms, paper, dyestuffs, morocco, cotton and woolen goods, curled hair, machinery, tools and chemicals. Hyde Park contains a public library. The town was incorporated in 1868. Annexed to Boston in 1912.

Hyderabad, *Hī″ der ah bahd′,* or **Haidarabad,** a city of India, capital of the state of the same name, situated on the Musi River. The chief buildings include the Char Minar, or College with Four Minarets, the Gosha Mahal Palace, the hospital, the Mecca Mosque, the British residency and several fine palaces in the suburbs. In addition to the Nizam College are industrial and professional schools. Silks, turbans, trinkets and cotton are manufactured, and the city is an important commercial center. Population in 1901, 448,466.

Hy′dra, a fabulous monster ravaging about the marsh of Lerna. Its central head was immortal, but when any of the other eight was stricken off, two sprang up in its place. The second labor of Hercules was to slay this creature. By the aid of his servant, Iolaus, he seared the mortal heads, for this alone checked their growth. The immortal head he buried beneath a rock. See HERCULES.

Hydra, Fresh-Water, a family of the order Cœlenterata, members of which are found in ponds and slowly-flowing streams. They are large enough to be seen with the unaided eye and may be found clinging to the under edges of floating leaves or submerged sticks. They are threadlike in form and have numerous tiny tentacles, some of which contain stiffened darts for wounding their insect prey; the other tentacles aid in grasping the wounded insect and in bringing it to the central mouth cavity. One of the peculiarities of the hydra is its remarkable power of recovery from injury. It has simple muscular and nerve cells and reproduces by budding.

Hydrangea, *Hī dran′ je a,* a wild or cultivated plant of the Saxifrage Family, often planted for ornament on lawns and in parks. The common hydrangea was introduced from China or Japan as a house plant. It is a low shrub, generally bushy, but by trimming, easily made treelike. The bark is reddish-brown and the slender branches bear oval, light green leaves, coarse in texture and deeply-veined. From the joints

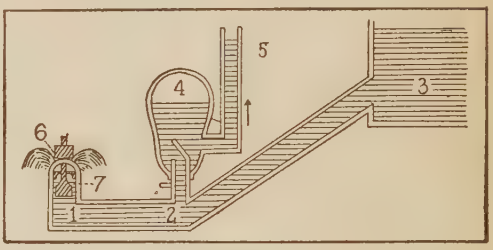
proceed handsome clusters of white, purple or pink flowers. The blossoms of each spray are of two kinds: sterile or those unable to bear fruit, and fertile, or fruit-producing. The sterile are always found around the border of the cluster, enclosing the fertile, but in the most highly cultivated hydrangeas few of the flowers are fertile. The fruit, when produced, is a little pod. The cultivated hydrangea is rapidly becoming a favorite ornamental shrub, for, though its branches are delicate and easily broken, the rich bloom well repays care. The sprays of flowers are often a foot long and form a thick cone whose base is from six to eight inches in diameter. These splendid sprays dry when picked, but retain their color through the entire winter and are often used for decorative purposes.

Wild hydrangeas, locally called oak hydrangeas, are stout shrubs growing along shady river banks from Pennsylvania south. These take readily to cultivation and are easily improved.

Hydraul'ic Limestone. See LIMESTONE.

Hydraulic Press. See HYDROSTATIC PRESS.

Hydraulic Ram, a device for using the force of a stream of water to raise a portion of the water to a higher level. In the figure, 3 represents the reservoir, or stream, and 2 the pipe through which the water flows by gravity. The pipe is turned upward at 1. The flow of water through the opening, 6, is controlled by a cone-shaped valve, 7, weighted and opening inward. An air chamber, 4, is connected to the pipe, 2, and is provided with a valve opening outward. When the water at first runs through the pipe, the valve, 7, is open and allows the water to flow out through the orifice, 6, and this flow continues until the force of the stream becomes sufficiently great to raise the valve and close the orifice. When this happens, the flow of water in the pipe, 2, suddenly stops, and the force of the current is such as to drive a portion of the water into the air chamber, 4, through the valve just above 2. As soon as the flow in 2 stops, the valve, 7, falls and the flow is again started. Water is forced into the discharge pipe, 5, and elevated by means of the elastic force of the air in 4. As so little water can be elevated in proportion to what is used, rams are not extensively employed.



HYDRAULIC RAM

Hydraulics. See HYDROMECHANICS.

Hydrochloric, *Hi" dro klo' rik,* **Acid.** See MURIATIC ACID.

Hy"drodynam'ics. See HYDROMECHANICS, subhead *Hydrodynamics.*

Hydrofluoric, *Hi" dro flu or' ik,* **Acid,** a colorless, fuming liquid composed of hydrogen and fluorine. It is highly poisonous, and injurious effects result from breathing even the diluted fumes. A drop of it upon the skin causes very painful burns and sores, which act with great rapidity in poisoning the blood. Hydrofluoric acid is largely employed in etching upon glass, particularly in marking glass measures. The glass to be marked is covered with wax and the design is traced deeply enough to remove the wax from the portions to be etched. The plate is then treated with hydrofluoric-acid gas, which cuts the parts not covered by wax.

Hydrogen, *Hi' dro jen,* one of the most widely distributed elements, a constituent of water. It was discovered by Paracelsus in the beginning of the 16th century and called inflammable air. In 1766 Cavendish ascertained by experiment many of its properties, and in 1783 Lavoisier found it to be one of the constituents of water and named it hydrogen, meaning water-producing. Hydrogen is a colorless, tasteless, odorless gas, which burns with a pale blue

flame and intense heat. It is a good conductor of heat and electricity and has been liquefied when subjected to a high pressure at a temperature of —241° C. The liquid is steel-blue in color and boils at —253° C. It has also been solidified.

Hydrogen is rarely found free in nature, that is, uncombined with other elements, but it does so occur in the craters of volcanoes and in some gas wells.

Hydrogen is most easily prepared in the laboratory by pouring dilute sulphuric acid upon zinc. The sulphuric acid is composed of hydrogen, sulphur and oxygen, and the zinc tends to replace the hydrogen, forming zinc sulphate and setting free the hydrogen. Since hydrogen is lighter than air, it must be collected in an inverted flask, from which it soon diffuses if allowed to stand. Hydrogen is a supporter of neither respiration nor combustion; hence an animal surrounded by an atmosphere of hydrogen soon dies, and an ordinary flame inserted in a flask of the gas is instantly extinguished.

Being the lightest of all gases, it has been used as the standard by which the relative weights of other gases were computed. Hydrogen is a constituent of all acids and is a little more than one-ninth, by weight, of water, which it produces when burned in the presence of oxygen. See OXYGEN; HYDROGEN; PEROXIDE.

Hydrogen Perox'ide, a compound of hydrogen and oxygen frequently used as a bleaching agent. It is composed of the same two elements as water, but differs from it by containing 32 parts of oxygen and two of hydrogen, while water has two parts of hydrogen to 16 of oxygen. Hydrogen peroxide is very unstable and easily gives up one-half of its oxygen; thus it changes to water and oxidizes whatever substance will take up the oxygen. It occurs in small quantities in the air and in rain water, to which it gives its fresh, pungent odor. The hydrogen peroxide on the market is very dilute, since in this condition it is more stable. In a pure state it is a colorless, sirupy liquid having a metallic taste and slight odor. If used in small quantities it bleaches the skin, but if applied too often or in too strong a form it discolors it and produces an irritating burn. It is used to restore the colors of oil paintings, to bleach feathers, ivory and even the teeth, to liberate iodine from potassium iodide and to render sores and wounds antiseptic. It is sold under various trade names, as hydrogen dioxide, dioxide, dioxygen, etc.

Hydrography, *Hi drog' ra fy,* that branch of physical geography which treats of the surface waters of the globe. It is concerned chiefly with the surfaces of oceans, lakes and rivers, particularly with reference to their importance in navigation. In practically every country of the world hydrographical departments are maintained by the central government for the purpose of making surveys and preparing charts of its navigable waters. These charts show the configuration of the coast line, location of channels, reefs, rocks and lighthouses and indicate the depth of the water. The work of the hydrographic offices of maritime countries is one of considerable magnitude. That of the United States is maintained at Washington, and it renders valuable service to navigation.

Hydromechanics, *Hi" dro me kan' iks,* the science of the mechanics of fluids in general, including both gases and liquids, especially water. It is usually treated under the two heads, hydrostatics and hydrodynamics.

HYDROSTATICS. Hydrostatics treats of the properties of fluids at rest, their compressibility and elasticity, the pressures exerted by them, their buoyant effect on immersed bodies and all other problems regarding fluids in equilibrium. Some of the more important laws of hydrostatics are here given. The force exerted by a fluid at rest against any surface is perpendicular to that surface, and the force per unit surface is called the pressure, measured in pounds per square inch or in dynes per square centimeter. At any point in a fluid at rest, either a liquid or a gas, the pressure is the same in every direction; and the difference in pressure at different levels

is equal to the weight of a column of the fluid of unit cross section extending vertically from one level to the other. For example, the water pressure at the bottom of an open tank 20 ft. deep is 62.5x20, or 1250, number of lb. per square foot, which equals 8.7 lb. per square inch, the weight of one cubic foot of water being 62.5 lb.

Pascal's Principle. Pressure is transmitted equally in all directions throughout a fluid at rest, and if the pressure at any point is increased, it is increased by an equal amount everywhere throughout the fluid. One of the most striking applications of this principle is found in the hydrostatic press. See HYDROSTATIC PRESS.

Archimedes' Principle. A body immersed, partly or wholly, in a fluid, is buoyed up by a force equal to the weight of the fluid displaced by the body. A boat sinks in the water until it displaces a weight of water equal to its own weight. A balloon rises in the air until the weight of the air it displaces is just equal to its own weight (See GRAVITY, SPECIFIC). For other laws of hydrostatics, see GAS; GASES, LAWS OF; CAPILLARITY; BAROMETER; and like topics.

HYDRODYNAMICS. Hydrodynamics treats of the properties of fluids in motion; the practical application of the principles of hydrodynamics to engineering problems constitutes the science of hydraulics. Some of the fundamental principles are stated below, together with reference to practical applications.

Torricelli's Theorem. When a jet of liquid escapes from a tank, the velocity of the issuing jet is equal to the velocity which a body would acquire in falling from the level of the upper surface to that of the opening. This velocity is independent of the density of the liquid and the direction of the jet, but is lessened by any viscosity of the liquid. If only the pressure is known, then the velocity is given by the equation v equals $\sqrt{\frac{2p}{d}}$, where p is the pressure in poundals per square foot, d the density in pounds per cubic foot and v the velocity of the jet in feet per second. This expression holds for liquids and gases.

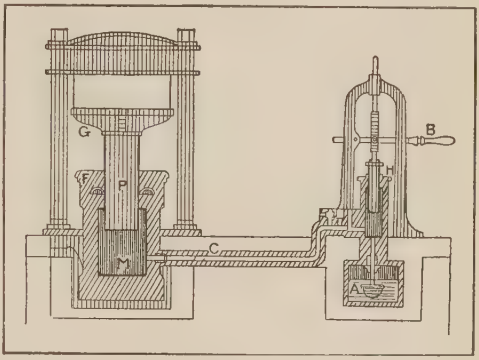
Energy Due to Pressure. When a liquid is forced into a vessel against pressure, the work done (in foot poundals) is equal to the product of the pressure (in poundals per square foot) by the volume (in cubic feet) of the liquid introduced. The total energy of a liquid flowing in a pipe is accordingly equal to the sum of its energy due to pressure and its kinetic energy due to motion. This leads to the remarkable fact that where a pipe is greatly contracted, the pressure of the flowing liquid is less than in the larger pipe on either side, since the increase of one form of energy must be at the expense of the other. This fact seems more reasonable if we consider that as the liquid is entering the smaller part of the pipe, its speed must necessarily be increased; hence the pressure behind it must be greater than that ahead of it. In going from the smaller to the larger part of the pipe it is slowed down; hence the pressure ahead must be greater than that behind. This principle is made use of in all aspirating pumps, in steam-boiler injectors and in many other ways. For practical applications to hydraulics, see PUMP; WATER WHEEL; HYDRAULIC RAM; and like topics.

Hydrom'eter, an apparatus for determining the specific gravity of fluids, especially that of water. Of the various constructions the best known is Nicholson's hydrometer, which not only measures the specific gravities of fluids, but of solids also. It consists of a hollow brass tube with conical ends. The instrument is weighted by a small cup which hangs suspended at the bottom of the cylinder which is thus caused to float upright in a cylindrical vessel containing the substance to be weighed. The tube is surmounted by a stem, bearing a graduated scale. The weight of the instrument having been ascertained and the additional weight required to sink it in distilled water to a point indicated on the stem, the specific gravity of any fluid is easily determined by mul-

tiplying the weight of a volume of water equal to that contained in one section of the graduated tube by the number of sections that the liquid allows the hydrometer to sink in the tube; that is, if the volume of one section weighs .05 grain and the hydrometer sinks to 20½°, .05x20.5, equal to 1.025, is the specific gravity of the liquid.

Hydrophobia, *Hi″ dro fo′ bia,* or **Rabies,** *Ra′ bi eez,* a disease which is communicated by the bite of a mad dog or other rabid animal, the peculiar poisonous virus in the saliva of the animal's mouth entering the blood of the victim through the wound. Treatment should be immediate and should begin with arresting the circulation in the region of the wound to prevent the poison from being taken up by the blood and carried into the system. Persons having no wounds or sores in the mouth may safely suck the poison from the wound, taking care to sterilize the mouth afterwards and to prevent the virus from reaching the throat. Cauterizing with an iron at white heat or with such cauterizing agencies as nitrate of silver, if thorough, will destroy the germ and prevent the disease. The Pasteur method of treating hydrophobia, which is now employed in most large cities, is an almost unfailing preventive. It consists in inoculating the patient with prepared virus of successively higher power until all the poison has been absorbed. If means employed to prevent hydrophobia are unsuccessful, symptoms of the disease may appear at any time from 6 weeks to 18 months after the bite is inflicted. The peculiar symptoms are nervousness, spasmodic muscular contractions and difficulty in swallowing. The progress of the disease is very rapid, and death results about three days from the appearance of the first symptoms.

Hy″drostat′ic Press, or **Hydraulic Press,** a machine for using the power of liquids to transmit pressure. It is of special value where great force is required, and is in common use for pressing cotton into bales, testing cannon and raising heavy weights. The press consists of two pistons, H and P, which are fitted by means of water-tight collars into their respective cylinders. The first piston, H, and its cylinder comprise a force pump which pumps water from the cistern, A, through the connecting pipe, C, into the cylinder, M. The second piston, P, is capped by a platform, G, on which the object to be pressed, in this case a bale of cotton, is placed. The piston, H, held in position by passing through the frame, B,



HYDROSTATIC PRESS

forces the water into M, and thus raises the piston P. If the piston H has an area of one square inch, and the piston P, of 100 square inches, every pound of force exerted upon H produces 100 lb. of force upon P and consequently upon the object on the platform; but the distance P moves is only 1/100 as great as the distance H is moved. In many cases oil is used instead of water. This press is an application of Pascal's Principle. See HYDROMECHANICS.

Hydrostatics. See HYDROMECHANICS, subhead *Hydrostatics.*

Hyena, *Hi e′ na,* a group of Mammals belonging to the Hyena Family and known only in central Europe, southern Asia and Africa. The hyena is an awkward animal, with a long muzzle, prominent, ferocious eyes and long, erect ears. The forelegs are the longer and give to the body a drooping, humpbacked appearance, and to the animal a shambling gait. The tail is somewhat bushy and the coat is of coarse, tawny hair, marked with darker stripes or spots. The

two most marked attributes of the hyena are its powerful jaws, which can crush with ease the largest bones of the ox, and its wild howl, which is frequently likened to the laughing shriek of the maniac. The home of the hyena is in natural or manufactured caverns, whence it issues, generally at night, to find for its food, carrion refused by braver animals. The three species of hyena are the brown, the striped and the spotted hyena, the last of which is the largest, the best known and the most courageous.

Hygeia, *Hi je' ya,* Greek goddess of health, daughter of Æsculapius, was greatly revered among the ancients. She was represented as carrying a snake and a cup, from which the snake drank.

Hygiene, *Hi' ji en,* the science or art of preserving health by preventing disease. As the prevention of disease depends upon a knowledge of the cause of disease, hygiene may be regarded as a branch of medical science. It may be classified as personal, domestic and public hygiene. Personal hygiene consists in taking the proper nourishment in the form of digestible diet, sufficient pure water and harmless beverages; in wearing clothing which will provide the proper protection; in taking the necessary sleep, and sufficient exercise to insure the normal action of the vital organs; in keeping the body clean; and in controlling vitiating habits which tend to undermine health.

Domestic hygiene concerns the administration of the household. It deals with the care of young children; the selection and combination, in a meal, of foodstuffs which supply the needful elements, and their preparation for the table; care of the sick, and household sanitation in general. Public hygiene implies the supervision of streets, sewerage and buildings in cities, and the maintaining of sanitary conditions. This embraces inspection of plumbing arrangements, such as drains and closets; ventilation; prohibition of promiscuous spitting; disposal of refuse in streets and buildings; regulation of conditions on trains and street cars tending to prevent overcrowding, accumulation of filth, and uncomfortable and injurious jarring; prevention of epidemics of infectious diseases by quarantine and inoculation; and disposal of the dead. See QUARANTINE; SANITARY SCIENCE.

Hygrom'eter, an instrument for measuring the absolute and relative amount of moisture in the air. A simple hygrometer, called the *hydroscope,* indicates but qualitatively changes in the humidity of the atmosphere. It can be made of any substance which contracts with the increase of humidity. Twisted cord, catgut and hair are suitable materials. A piece of twisted catgut stretched by a light weight will twist and untwist with a change in atmospheric humidity, and a light pointer attached and moving over a scale will indicate the change. The wet and dry bulb hygrometer most commonly used in stations of the weather bureau consists of two similar delicate thermometers fastened side by side on a stand. The bulb of one is covered with muslin, which is kept wet by a wick which extends into a cup of water. If the air is not saturated, evaporation occurs from the bulb, and this reduces the temperature. The difference in temperatures in the two thermometers indicates the relative humidity of the atmosphere.

Hyksos, *Hik' sose.* See EGYPT, subhead *History.*

Hy'men, Greek god of marriage, son of Apollo and a Muse, was invoked at every nuptial festival. He was represented as crowned with flowers of marjoram, carrying the wedding veil and torch and wearing wings and sandals of gold.

Hy"menop'tera, a group of interesting and intelligent insects, including the ants, bees and wasps. The name Hymenoptera means membrane wing and is given to this group because the wings of these insects have few veins. The development from egg to adult embraces the four stages of insect life, egg, larva, pupa and adult; hence the Hymenoptera are said to undergo complete metamorphosis. In the larval and pupal stages

they are helpless and are cared for in cells skillfully constructed by the adults. Their mouths are fitted for biting and for sucking. In organization and division of labor the colonies of ants, wasps and bees show great advancement. This group of insects is of great value to man, not only in the production of honey but in the even greater usefulness of fertilizing many of the flowers, which, without them, would never reproduce. See CROSS-FERTILIZATION; BEE; ANT; WASP; INSECTA.

Hymn, *Him,* a religious song. More particularly, a hymn is a poetic composition, divided into stanzas and designed for public worship. The hymn has been used in some form or another for many centuries, for penitential hymns have been found on Assyrian tablets, and the sacred books of the ancient Persians and Hindus contained numerous songs of this nature. In Greece there was a song to celebrate every event, and as early as 700 B. C. Archilochus and Callinus wrote hymns. Before the Christian Era the highest form of songs used in worship were found among the Hebrews, notably in the book of *Psalms.* Various other songs of praise occur in the Bible, such as that of Miriam in *Exodus xv* and that of Deborah in *Judges v.*

Hymns were used in the services of the early Church, the oldest one extant, *A Hymn to Christ the Savior,* dating from about 200. During the Middle Ages many fine hymns were written in Greek and Latin, among which are the great judgment hymn *Dies Iræ* (Day of Wrath) and *Stabat Mater* (the Mother stood). With the Reformation came the introduction of hymns in the language of the common people. Luther, the great hymn writer of that period, left about 37 songs, best known of which is his stirring battle hymn of the Reformation, *A Mighty Fortress Is Our God.* In 1524 the first evangelical book of hymns was issued. During Luther's time and for many years after, Germany produced a large number of great hymns. In England, we find such names as George Wither, John Milton, Henry Vaughan, Jeremy Taylor and Robert Herrick in the list of early hymn writers; later came Isaac Watts, and, still later, Charles Wesley, the author of 6000 hymns. Other famous writers of religious songs were Reginald Heber, John Keble, Frederick W. Faber and John Henry Newman. Among the great hymns of England are two by women—Mrs. Sarah Flower Adams' *Nearer, My God, to Thee* and Miss Charlotte Elliot's *Just as I am without One Plea.*

America has also produced notable hymn writers. Among the great hymns by American authors the following are representative of the best: *One Sweetly Solemn Thought,* by Phœbe Cary; *My Faith Looks Up to Thee,* by Ray Palmer; *Battle Hymn of the Republic,* by Julia Ward Howe; *Pass Me Not, O Gentle Savior,* by Fanny Crosby; *My Country, 'Tis of Thee,* by Samuel Francis Smith; *Softly Now the Light of Day,* by George W. Doane; *Ancient of Days,* by William C. Doane; *O Little Town of Bethlehem,* by Phillips Brooks; *I Love to Steal Awhile Away,* by Phœbe H. Brown; *Gently, Lord, Oh, Gently Lead Us,* by Thomas Hastings; *I Love Thy Kingdom, Lord,* by Timothy Dwight.

HYMN TUNES. Music was composed for hymns as early as the fourth century A. D., but it was not until the time of the Reformation that rhythmic music was used in connection with hymns. Previous to this it had been of the nature of chants or somewhat somber in character. It was Luther who aided most in adopting popular airs to sacred words. In England, the real history of hymn tunes begins with the 18th century, which reached their highest point in the music written for the hymns of Charles Wesley. The modern tendency, in America, for some time has been to use "catchy" music, especially in the Sunday school. There is an undercurrent of revolt, however, against the cheapening of sacred music, which will undoubtedly bear fruit in time.

Hymns, National, the popular songs which are expressive of the patriotic sen-

timents of a nation or people. The term includes those songs which are used on ceremonial occasions and have received recognition as *national hymns* by legislative enactment or royal decree, as well as songs which have won their way into popular favor independent of such recognition. Folk songs are the basis of national hymns, but differ from them in being individualistic, rather than expressive of the ideas and feelings of a whole people. Among American national hymns which have become favorites are *Yankee Doodle, The Star Spangled Banner, Hail Columbia, Columbia, the Gem of the Ocean, Dixie, The Battle Hymn of the Republic* and *My Country, 'Tis of Thee.*

YANKEE DOODLE. The tune of *Yankee Doodle* was first heard in America in 1755, in the camp of General Braddock, at the beginning of the French and Indian War. The miscellaneous assortment of costumes worn by the colonial troops assembling in camp was a source of great amusement to the British troops, and one of their number, Dr. Richard Shuckburg, remembered an old song with which the Cavaliers had taunted Cromwell when he rode into Oxford. The words were:

"Yankee Doodle came to town,
Upon a Kentish pony;
He stuck a feather in his cap,
Upon a macaroni."

Dr. Shuckburg wrote down the notes and words of the old doggerel and before long the whole camp was sounding with the song, in ridicule of the colonial troops. Later, the words which are now generally used were written and adapted to the tune, and were sung at the Battle of Bunker Hill in 1775. The origin of the tune is uncertain. Several European nations claim it, among them Hungary, Holland, Spain, France and Italy.

THE STAR SPANGLED BANNER. The author of this inspiring hymn was Francis Scott Key (1780-1843), of Baltimore. In 1814 during the War of 1812, he visited the British fleet under a flag of truce, to obtain the release of a friend. Compelled to remain on a British ship during the bombardment of Ft. McHenry, he remained on deck all night, waiting in painful suspense for the outcome of the battle. At dawn he turned his glass toward the fort, rejoicing to see that the Stars and Stripes still floated, and while on his way to shore composed the poem which is so well known. The air is that of an old English song, *Anacreon in Heaven.*

HAIL COLUMBIA. This song was written by Joseph Hopkinson (1770-1842), lawyer, congressman and judge of the United States District Court, in the summer of 1798. At this time America and France were on the verge of war. A friend of Hopkinson, a young singer, desired a patriotic song for a benefit to be tendered him at one of the Philadelphia theaters. In the state of public excitement, some ringing words to the tune of the then popular *President's March* would bring a full house. Hopkinson produced the poem beginning "Hail, Columbia! happy land." It immediately won popularity, especially as it appealed to all loyal Americans, regardless of party or faction. The *President's March,* to which the poem was adapted, was composed in honor of President Washington. Some dispute exists as to its composer.

COLUMBIA, THE GEM OF THE OCEAN. This popular song was written in 1843 by a young actor named Thomas à Becket, at that time playing in Philadelphia. It was composed to be sung on the benefit night of a fellow actor. The melody was also composed by the author of the poem. The song became very popular in London, being there printed under the title *Britannia, the Pride of the Ocean.*

DIXIE. Though a Southern song, Dixie is a favorite throughout the North. It was written in 1860, by Daniel C. Emmett, an actor whose specialty was negro impersonations. The idea for the song was conceived by him several years before, when he was traveling through the North as a circus man. The expression "I wish I was in Dixie's land" was frequently heard on cold days when the

shivering circus men recalled the sunny South. At the time *Dixie* was written, Emmett was singing in a Broadway theater. He composed it for his own use, and, to quote his own words, "It caught on from the first and took the country by storm." The tune is said to have been appropriated from an old negro air.

The Battle Hymn of the Republic. Julia Ward Howe, the author of this magnificent song, was traveling to Washington in December, 1861, in company with her husband and a few friends. They reached the city at night, and the gleam of the camp fires and the sounds of preparation for war greatly stirred Mrs. Howe. During the next few days her first impressions were intensified by the military atmosphere in which she lived and by the enthusiasm of the soldiers who sang, as they marched, *John Brown's Body*. The words of her famous hymn came to her one night after she had gone to bed, and it is recorded that she wrote them out at once, lest she forget them by morning. Mr. James T. Fields, editor of the *Atlantic Monthly,* in which the poem was first published, gave the song its title. Nearly a year later the prisoners in Libby Prison were led by Chaplain McCabe in singing this splendid battle hymn.

My Country, 'Tis of Thee, or America. This song was written by Samuel Francis Smith, a clergyman and hymn writer, in 1832, and was first sung in Boston, on July 4 of that year. It is the most familiar of American national songs. The air is that of the British song *God Save the King*.

The following list gives the national hymns of several important nations:

Austria, *Gott erhalte unsern Kaiser* (God preserve our Emperor). Music by Haydn; words by Haschka.

Brazil, *Hymn of the Proclamation of the Republic.* Words by Albuquerque; music by Miguez.

France, *La Marseillaise,* by De Lisle.

Germany, *Die Wacht am Rhein,* by Schneckenburger.

Great Britain, *God Save the King,* probably by Carey.

Greece, *Sons of Greece, Come, Arise.*

Holland, *William of Nassau.*

Italy, Air—*Royal March,* by Gabetti.

Japan (translated), *May the Empire Last.*

Mexico, *Mexicans at the Cry of War,* by Nuno.

Norway, *Song for Norway,* by Björnson.

Russia, *God Protect the Czar.* Words by Zhukovsky; music by Lyoff.

Spain, *Himn de Riego.*

Sweden, *Out of the Swedish Heart.*

Hypatia, *Hi pa' shi a,* (about 355-415), a Greek philosopher. She was the daughter of Theon, an astronomer and philosopher of note in Alexandria. Hypatia was a woman of unusual beauty and chastity, both of mind and body. Her father taught her all the accomplishments and learning of the day, and she finally succeeded him as lecturer in philosophy at Alexandria. Her great success excited the jealousy of some of the Church Fathers, some slanderous tongues wagged against her, and at last a mob led by priests seized her on the way home from one of the lectures, and murdered her. Her tragic story furnishes the basis of Charles Kingsley's *Hypatia.*

Hyperion, *Hi pe' ri on,* in earliest Greek mythology a Titan, the original sun god, later identified with Apollo. He married Thea, by whom he was father to Aurora, the sun and moon.

Hypnotism, *Hip' no tiz'm,* the inducing of a state resembling sleep, called hypnosis. This state, though superficially like sleep, differs from it in many particulars, chief among which is that known as extreme suggestibility. The subject, at the suggestion of the operator, is able to perform in a hypnotic state, actions which he is not accustomed to perform and at least feels unable to perform in his normal state. The majority of subjects, however, cannot without difficulty be made to perform actions which are contrary to their beliefs and to their natural tendencies. Thus, though a subject seems readily willing to stab with a pasteboard dagger, he is unwilling to do so with a real one.

The hypnotic state is seen to differ from sleep also in the rapidity of the pulse, the shortened respiration, the loss of feeling and the capability of producing local physical changes, such as the dilation of blood vessels, the raising of blisters or the functioning of an organ. The suggestibility of the subject has led to the use of hypnotism in the curing of disease, and is practiced, though with care, by many physicians. During the ordinary hypnotic trance the subject is unconscious of his actions and fails to recall them after awaking. If, however, *posthypnotic* suggestions are given, they are carried out after the hypnosis is passed, and by such suggestions the memory of the actions during the trance is retained.

Hypnosis is brought about by various means: suggestions; downward passes over the face and body; pressure upon certain muscles, especially those at the root of the thumbs or upon the forehead; or requiring the subject to fix his eyes upon some bright object and to fix his mind, as far as possible, upon vacancy. The method of arousing the subject is also by suggestion, that is, merely commanding him to "wake up," or by making upward passes over the face and body.

Autohypnotism, that is, the hypnotism of one's self, may be induced by the same method as sleep is induced: relaxation of the mind and body or fixing the eyes and the thought upon one object. In the advance of psychological study, the value of hypnotism, its processes and results are being more studied and better understood. No doubt the coming years will bring to light much that is at present misunderstood or wholly unknown. Hypnotism was formerly called mesmerism after Friedrich Mesmer, who first used it in curing disease. The present name was applied in 1842 by James Braid, an English surgeon.

A thoroughly readable book on the mental treatment of disease, and one including much valuable information upon hypnotism, is that by Hugo Münsterberg, entitled *Psychotherapy*. In James's *Psychology* there is a full treatment of the subject of hypnotism.

Hyssop, *His' up,* a Mediterranean herb of the Mint Family having the characteristic square stems, opposite, aromatic leaves and two-lipped, tubular flowers of the class. The plant has been naturalized here because of its medicinal properties and its use as a flavor. It has a coarse stem with stiff, long leaves, pointed at either end. The flowers, which are of pale violet color, are crowded closely in the leaf axils and are rather inconspicuous. The plant is found growing in waste lands from Maine west to the Rockies and as far south as Tennessee. A European hyssop is a member of the Figwort Family. The hyssop mentioned in the Bible as being used by the priest at the time of sacrifice is not the same as either of these, which are unknown in Palestine, but is a small leafy herb growing throughout the eastern Mediterranean region.

Hysteria, *His te' ri a,* a nervous disorder, affecting not only the brain and spinal cord, but the peripheral nerves and sympathetic system. Women are more commonly affected than men. Predisposing causes of a hereditary nature are parental epilepsy, insanity, hysteria or alcoholism. Hysteria is precipitated or aggravated by overwork, responsibility, worry, mental shock or injury to the nerves resulting from accident. The chief remedial features are change of environment and relief from worry. Some cases respond to mental suggestion. See HYPNOTISM.

I

IBERVILLE, *De" ber" veel',* **Pierre le Moyne,** SIEUR D' (1661-1706), a French Canadian soldier, naval commander and explorer, born in Montreal. After a training in the French navy he returned to America, and, in 1686, commanded an exploring expedition from the Ottawa to James's Bay. Later he was active in King William's War. In 1699 he sailed from France to the Gulf of Mexico in search of the mouth of the Mississippi. He established Biloxi and Mobile, thus becoming the founder of Louisiana. He died in France.

I'bex, a name applied to several species of wild goats, all belonging to the Bovine Family and inhabiting Abyssinia, Syria and the Himalayas. The ibex is a swift, agile animal with huge, curving horns connected on the forehead by heavy, bony ridges. The Alpine ibex is called the steinbok or steenbok, and is fast becoming rare except in the lower Piedmont regions.

I'bis, a heronlike bird with a long, curved bill. Many species are known, living in nearly all parts of the world. The sacred ibis of Egypt was venerated by the ancients and many mummies of them have been found. This bird is about 28 inches long; the body is white, with bare, black neck and purplish-black tertiary feathers falling over the tail like a plume. In North America two ibises are common: the white ibis, with pinky-white plumage, black-tipped wings and naked face and chin; and the white-faced glossy ibis, with dark chestnut plumage, the crown and wings with purplish and greenish iridescence, a white face and the space between the eyes and bill red. Both birds are from 19 to 27 inches in length. The nest of the latter is made of rushes and other water plants and is placed among the rushes in a marsh. It contains three greenish-blue eggs. The habits and food of the ibises resemble those of the herons.

IBIS

Ib'sen, Henrik (1828-1906), a Norwegian dramatist, born in Skien. He was an apprentice to an apothecary in Grimstad for seven years, and later was a student at the University of Christiania. After directing the National Theater at Bergen he became manager of the Norwegian Theater at Christiania in 1857. His early plays were received with contempt, and he soon began to write satiric attacks on the ignorance and degenerate political condition of his country. Failure to receive the poet's pension and bitterness because of his circumstances in general caused him to leave Norway in 1864. He lived in Copenhagen, Dresden, Munich and Rome, returning to Christiania in 1891. *Brand,* published

in 1866, brought him the pension he desired and met with enthusiastic reception. Following *Peer Gynt,* another lyric-dramatic satire, came the prose dramas, almost every one urging social reform. After 1901 his failing health made further mental effort impossible.

He was a master of dramatic construction and dialogue. In several of his plays the climax is represented as having occurred before the opening scene, the drama itself being concerned with the consequences alone. His themes were far from popular. Like Carlyle, he found society diseased; like him, too, he was content to point out the evil without proposing a remedy. He analyzed society, but he never posed as a moral teacher. Social hypocrisy was the object of his keen and well-directed satire time and again. *Peer Gynt* is Norway personified,—Norway with its faults and weaknesses; but the hero, as a human individual, becomes more than a type. This magnificent drama represents some of the best Europeon poetry of Ibsen's time. In *Brand* he makes a brilliant protest against compromise; and through the hero—the priest who tries to live like Christ and suffers under the contempt of his weak and cringing companions—the poet touches noble heights. Among Ibsen's other works are *The Pillars of Society, A Doll's House, Ghosts, An Enemy of the People, The Wild Duck, Rosmersholm, The Lady from the Sea, Hedda Gabler, Lille Eyolf, John Gabriel Borkman* and *When We Dead Awaken.*

Icarus, *Ik' a rus,* mythical son of Dædalus. See DÆDALUS.

Ice, water frozen into a solid state. Under ordinary conditions pure water becomes solid at 32° F. Impurities, such as salt in solution and increase of pressure upon the surface, tend to lower the freezing point. Sea water freezes at a lower temperature than fresh water. When water freezes, most of the salts held in solution are separated from it. Hence pure water can be obtained from sea water by freezing. When water freezes, it expands; hence ice is lighter than water. This expansive force is so great that it is practically irresistible. Not only all glass and earthen vessels burst when water in them freezes, but iron vessels seem to offer no better resistance, and even rocks are rent asunder by this force, many of the huge rocks lying at the foot of cliffs being broken off by water freezing at first in small cracks, then in the larger cracks formed each succeeding season.

ICE HARVESTING. Natural ice from the lakes, streams and rivers of cold regions is harvested in winter. The first step is to clean off the snow and trash by means of a sort of a scraper; after this the field is run over by a marker drawn by a horse, which cuts parallel grooves in the ice about three feet apart; then another set of grooves is run across the ice field at right angles to the first and about the same distance apart. The ice is cut into cakes by a special form of plow, consisting of a steel bar, to which is attached a set of knives, one behind the other. The plow cuts into the ice only a few inches. When the plowing is finished, the first cake is cut out by a saw; the others are then split off by striking a wedge-shaped steel bar into the cuts made by the plow. The cakes are finally floated to the foot of an elevator, which takes them to the desired story of the ice house, where they are packed in sawdust until needed.

On the Hudson River, in Maine and on the lakes and streams of Wisconsin and Michigan, particularly near Chicago, many ice houses of great magnitude are erected. Some of these buildings are nearly 300 ft. long and five stories high, and are equipped with galleries running the entire length of the building, which are lowered or hoisted, as may be desired, to each of these stories for loading the ice. Special devices are used for loading cars from the ice house, and a steam power plant furnishes the power.

MANUFACTURE OF ICE. In localities removed from natural ice production, it is often cheaper to make ice by artificial means than to transport it. There are several types of apparatus for mak-

ing ice, all depending for success upon the principle that cold is produced by the expansion of compressed air, gas or a liquefied vapor like ammonia. The most commonly used machines are those in which anhydrous, or waterless, ammonia is employed, and in which there is an evaporator or congealer by which the ammonia is vaporized. This vapor is then compressed by a pump or air compressor, and when it is allowed to expand in coils of pipe, produces intense cold. The process is made continuous and the liquid ammonia is used over and over. Cans of distilled water are placed in a tank of this liquid, which freezes the contents of the can into a block of ice. As this ice is free from all impurities, it is much preferred to natural ice. Recent improvements in the art have been productive of very low-priced plants on such scale as to allow hotels, hospitals, asylums, etc., to install them and make their own ice and have means for cold storage. See COLD STORAGE.

Iceberg, a very large body of ice that has become detached from its parent glacier on the shores of the polar regions and which floats about in the ocean, driven hither and thither by wind and current. Icebergs are sometimes several miles in length and rise above the water 200 to 300 ft. The part above the water is estimated at one-eight or one-ninth the entire mass. This does not mean, however, that icebergs extend eight or nine times as far beneath the surface as they rise above it. The greater part of the mass of the berg is near its base; therefore the depth may not exceed or even equal the height, as in case of those which taper to needlelike pinnacles. However, most icebergs extend to a much greater depth, sometimes as far as 1200 or 1400 ft. They often become grounded in shallow water, where they remain until broken up.

Icebergs assume many fantastic forms. Sometimes they resemble mountain peaks or huge masses of rock broken from a cliff. Again they take weird and fanciful forms consisting of pinnacles, domes, peaks and minarets, until they rival in beauty and oddity the most fantastic castles ever reared in the whimsical brain of a fairy princess. Icebergs often contain outlying spears which project outward under water and are very dangerous to vessels, because they cannot be readily located. Large bergs often contain pools of fresh water formed by the melting ice. Under the action of the sun and warm winds icebergs disintegrate rapidly, often breaking apart by their own weight and with a report that sounds like the boom of a cannon.

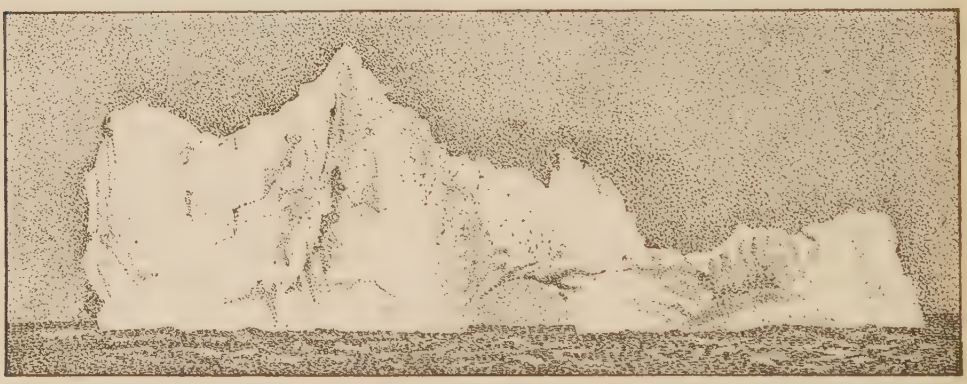
Fields of ice form on the surface of temperate waters in winter and break off in spring. A floating mass of field ice is called a floe, and an aggregation of floes caused by refreezing forms what is known as a pack. Icebergs are found in both the Arctic and Antarctic regions, but because of their danger to navigation those found in the vicinity of Greenland and floating southward receive the most attention. While the bergs move very slowly, their enormous weight gives them a power sufficient to crush the largest ship as though it were an eggshell. Therefore, they are greatly feared by navigators, and that part of the Atlantic in which they are most numerous has been the scene of many wrecks, the most disastrous occurring on Apr. 14, 1912, when the steamship *Titanic* was sunk by collision with an iceberg and over 1500 persons perished. See TITANIC, THE.

Since most of the vessels plying between the United States and Europe pass directly through that part of the Atlantic most thickly strewn with icebergs, the United States Hydrographic Office at Washington uses all possible means to warn ships of their presence. All ships approaching an iceberg or entering fields of ice are required to send out wireless-telegraph reports of the exact location of such bergs or fields. These reports reach the office at Washington and all ships in the vicinity, provided they carry wireless apparatus. Ship commanders are also given directions for detecting the appoach of icebergs, such as the effect of their reflection of light upon the sky, the echo of steam whistles or fog

horns and the booming sound given off when they fall apart. The near presence of a large berg is also usually indicated by a sudden drop in temperature. Marine signal stations are maintained at numerous points on the coast of Newfoundland, Canada and St. Pierre, from which information can be obtained.

Iceland, a large island about the size of the State of Ohio, in the North Atlantic Ocean, a dependency of Denmark. It is situated about 250 m. from Greenland and 600 m. from Norway; its northerly points are touched by the Arctic Circle. Of its area of 40,456 sq. m., only about two-fifths are inhabited. The plateaus and highlands are unfit for cultivation and an area of 5200 sq. m. is covered by glaciers. There are immense craters filled with water, but no large lakes. The snowfields give rise to large rivers, the longest of which are the Jökŭlsá, Thjórsá and Oelfusá. The climate is not unduly severe, as the latitude might suggest, but snow falls on the interior highlands even in summer. The summers are short and cool; the winters, long and damp. The vegetation is confined principally to the lowlands, and even the grass grows only within restricted limits. Heather is abundant. Few trees attain other than a stunted growth, and no fodder is yielded for the cattle until the end of July. The fox is the most familiar animal, though reindeer, cattle, horses, sheep and dogs are common. The sea and seashore are dense with cod, flounders, herring and eider duck. The down of the latter is of great commercial value.

The inhabitants of Iceland are Scandinavians. Their struggle for existence against nature has developed sturdiness and endurance, and a quiet earnestness touched with melancholy is their prevailing characteristic. They are highly intellectual, and illiteracy is practically unknown, as the children are early taught to read the old Sagas, with which Icelandic literature is so richly endowed (See LITERATURE, subhead *Scandinavian Literature*; EDDA). It is estimated that in no other country are there so many books and newspapers published and sold in proportion to population as in Iceland.



ICEBERG

The island was discovered by Norsemen about 870. One of the early settlements was Reykjavik, the present capital. The country was converted to Christianity in 1000, under King Olaf Tryggvason of Norway. In the 12th and 13th centuries intercourse with other countries was extensive, and the island flourished politically. Iceland was joined to Norway in 1262, and in 1380 came under the rule of Denmark. Population in 1910, 85,089.

Iceland Spar, a transparent variety of calcite, so called because the finest specimens come from Iceland. It is used for optical instruments. See POLARIZATION OF LIGHT.

Ice Yachting, *Yot' ing,* an American sport developed throughout the Northern States and Canada since 1790. Tournaments are held at Poughkeepsie and Newburgh on the Hudson River; at Lake Minnetonka, near Minneapolis; Lake Winnebago, near Oshkosh, Wis.; on Lake Champlain, the St. Lawrence River, Lake Ontario and at other places; while hundreds of those living near small lakes use ice yachts for occasional recreation. The ice yacht has usually one large sail, and often a smaller jib sail. Races are ordinarily five times around a triangle measuring one mile on each side. Under favorable conditions and on a straight course, yachts frequently sail at the rate of from 40 to 70 m. an hour, running away from express trains on parallel tracks. The body of the yacht is in the form of a cross and is supported on runners which are now of the rocker type. One of the runners is mounted on a pivot and serves as a rudder.

Ichneumon, *Ik nu' mon,* a small animal of the Civet Family found in the region of the Mediterranean. Its size varies from that of a rat to that of a large house cat. In general color the ichneumon is brown, though it often has a black stripe at the back of the neck and a black tail; a southern Egyptian species has a hairy, white tail. The body is long, the legs short, the nose pointed and the eyes bright and active. In many countries, especially Egypt, it has been partially domesticated because of its agility and skill in killing dangerous reptiles and discovering buried nests of crocodile eggs, which it destroys. Under care the ichneumon becomes as fully domesticated as a kitten; it is variously called mongoose, mungoos and, in Egypt, Pharaoh's rat.

Ichneumon Fly, a family of slender, bright-colored Insecta of the order Hymenoptera. They have flattened abdomens, which are of a metallic luster, yellow-banded antennæ and yellow and black wings. Their life in the adult stage is short, lasting but a few days at the longest. They lay their eggs either beneath the skin of caterpillars or in trees which certain caterpillars infest. The tiny white cocoons of the ichneumon fly may often be seen protruding from the hairs upon the back of the caterpillar, and take up so much of its host's vitality that the caterpillar seldom survives. Ichneumon flies are of economic importance because they destroy many injurious insects. See HYMENOPTERA.

Ichthyosaurus, *Ik" thi o sor' us,* an extinct order of fishlike Reptilia, the fossil remains of which occur in the Mesozoic rocks of Europe and North America. The animal had a round, tapering body, covered with thin, smooth skin; the head was long, with a long tapering snout, the neck short. The teeth were conical in shape and very numerous, as many as 400 occurring in a single mouth. There was one triangular fin in the middle of the back and a vertical fin on the tail; the feet were broad and shaped like paddles. Skeletons of the animal found in rocks show evidences of pulmonary respiration, indicating that the animal lived in the air.

Iconoclasts, *I kon' o klasts,* (image breakers), the party in the early Christian Church that objected to the presence and adoration of images in the house of worship. In the sixth century the images of martyrs and saints, placed in the churches as a remembrance, began to be worshiped, incense being offered in their honor and lights being burned before them. In the eighth century a strong sentiment was created against the use of images in worship, and a reform party, called Iconoclasts, arose, which declared that the Christians had fallen into idolatry. Leo III, Eastern Roman emperor, was a zealous Iconoclast, and in 726 he ordered the people to abstain from the worship of images, whose destruction he decreed. The Bishop of Rome opposed the royal edict and excommunicated Emperor Leo, besides cutting off from communication with the Western Church all Iconoclastic churches. The controversy lasted over a century. In 842 a council at Constantinople sanctioned the worship of images in the Greek

Church. In its present use the term refers to one who attacks cherished beliefs or ideas.

Ictinus, *Ik ti' nus,* an Athenian architect living in the fifth century B. C. He was a contemporary of Callicrates, and with him designed much of the Parthenon. He also was the architect of the Hall of Mysteries at Eleusis and of the Temple of Apollo near Phigalia. Though little is known of his life, his ability is recognized from those of his works that remain.

I'da, a mountain range of Asia Minor, extending through Phrygia and Mysia. The highest peak is Mt. Gargarus, near the plain of Troy, 5748 ft. in height. Another Mt. Ida, equally famous, is the one in Crete, rising 8000 ft. above sea level. In a cave of this mountain—as the legend runs—Zeus is once supposed to have been nurtured.

I'daho, THE GEM OF THE MOUNTAINS, one of the Mountain States, is bounded on the n. by Canada, on the e. by Montana and Wyoming, on the s. by Utah and Nevada and on the w. by Oregon and Washington.

SIZE. The extreme length from north to south is 490 m. The length of the northern boundary is 45 m. and that of the southern boundary is 325 m. The area is 83,888 sq. m., of which 534 sq. m. are water. Idaho is about the size of Minnesota, a little larger than Kansas, about the size of New York and Pennsylvania combined, about twice the size of Tennessee and the 12th state in area.

POPULATION. In 1920 the population was 431,866. From 1910 to 1920 there was a gain in population of 106,272, or 32.6 per cent. There are 5.2 inhabitants to the square mile and the state's rank in population is 43.

SURFACE. Idaho lies between the Rocky Mountains on the east and the Cascades on the west, and the southern part reaches to that section of the United States known as the Great Basin. The Rocky Mountains with their extensions, the Bitter Root, Cœur d'Alene and Cabinet ranges, form most of the Montana boundary. The northern part of the state is a succession of wooded hills and fertile valleys. To the west and farther south is the region of the Palouse Prairies, a succession of rolling hills; to the west of the Palouse region is a mountainous section, rich in ore. In the central portion of the state is its most broken and mountainous region, through which flow the Salmon and Snake rivers, making canyons rivaling any on the continent. In this region are the Seven Devils, Yellow Jacket, Salmon River, Lemhi and Lost River ranges, some of whose peaks are 12,000 ft. in altitude. Bear River, Hansel, Black Pine, Goose Creek and Owyhee mountains are in a succession of ranges across the southern boundary of the state, the general trend of these ranges being north and south. The highest mountain range is the Teton, on the Wyoming boundary. The one great valley of Idaho is the Upper, Middle and Lower Snake River Valley, which includes numerous smaller valleys along the streams flowing into it. The elevation of the state varies from 700 ft. in the western part of the Panhandle, along the Snake, to nearly 7000 ft. in the extreme southwestern part, the mean elevation being less than 4000 ft.

RIVERS AND LAKES. With the exception of a section in the southeastern part, the entire state is drained into the Columbia River. The Kootenai, the Clark and the Spokane drain the northern part. The Clearwater and Salmon with their tributaries, both of which flow into the Snake, drain the central part, and the Snake with its tributaries drains the southern part. The Snake is the most important stream, and its chief tributaries aside from those already mentioned are, from the north, the North Fork, the Wood, the Boise, the Payette and the Weiser. From the south it receives the Raft, the Goose Creek, the Bruneau and the Owyhee. In the south-central part of the state is a region in which the rivers disappear in the earth. Some of them reach the Snake by subterranean channels. This region constitutes what is known as the Lost River drainage

system, of which Big Lost River is the most important stream.

One of the largest inland lakes in the country, outside of the Great Lakes, is Lake Pend Oreille in northern Idaho, with 500 m. of shore line. Bear Lake in southeastern Idaho is next in importance. Besides these, there are the Payette Lakes, Hayden, Cœur d'Alene, Priest and many lesser but beautiful lakes of central and northern Idaho.

Scenery. The sides of the mountains are covered with forests and the lowlands are green with native grass or with the crops of the cultivated farms. Shoshone Falls, on the Snake River, is one of the most noted cataracts in America, exceeding Niagara in height and rivaling that famous cataract in grandeur. Twin Falls on the same river are also of more than local interest, and Salmon Falls on the Salmon River are of equal importance. Along the Snake River is a lava bed containing numerous geysers and hot springs. In Lincoln County is a cluster of springs known as the Thousand Springs, which discharge a large volume of water into the Snake River.

Climate. The state has a wide range of temperature owing to its extent from north to south and its many variations in altitude. On the plains and in the valleys the summers are warm but salubrious, and there are occasional days when the temperature may reach 100°. In the uplands of the same latitude, however, the temperature may be much lower. In the mountains the winters are severe and the fall of snow is heavy. On the lowlands the winters are mild and the snowfall is light. In many places stock grazes throughout the winter. The climate of the entire state is modified by winds from the Pacific and is more equable than in the regions of the same latitude east of the Rocky Mountains. The rainfall is heavy in the northern part, being 30 inches or more per year; in the central part it ranges from 20 to 25 inches, and in the south it is less than 15 inches.

Minerals and Mining. Nearly all the mountain districts contain immense deposits of gold, silver, copper and other ores. In 1910 the output of gold amounted to over $1,465,000; of silver, $3,625,000; of lead, $9,356,000; and of copper, $1,035,000. The chief mining districts are the Cœur d'Alene, the Elk City and Oro Grand, the Buffalo Hump and Concord in the northern part of the state, the Silver City and DeLamar in Owyhee County, the Boise Basin district, the Wood River mines in Blaine County and the Lemhi County and Custer County mines. Shoshone County in the northern part of the state produces the largest amount of ore.

Coal is found in a number of places and mines are in operation in Teton Basin and on the Payette River in Boise County. In the vicinity of Bear Lake are found some of the nation's greatest beds of phosphate rock. Marble is found in the southeastern part of the state, and good building stone is found in practically all parts.

Forests and Lumber. In the mountain regions in the north and north-central parts of the state are extensive forests of soft wood, including white and yellow pine, red and white fir, cedar, hemlock and tamarack. The central counties are considered to have the largest virgin white pine forests in the world. Valuable forests are also found in the mountain regions in the southwestern part of the state. The government has established 20 national forest reserves within Idaho, covering 37 per cent of the state's area; 19,890,000 acres in Idaho are recognized as forest lands. There are within this area over 330 sawmills working up about 650,000,000 board feet of lumber annually.

Agriculture. With the exception of an irrigated fruit-tract area near Lewiston, irrigation is confined to southern Idaho, where the rainfall is less than 20 inches. In 1910 irrigation had been developed so as to include 2,457,000 acres, with a total length of irrigation canals in operation of 10,490 m. There are several United States reclamation projects within the state. See Irrigation.

Soil. In the mountain regions the soil

is somewhat clayey; on much of the lowlands it is formed largely of decomposed lava and is very fertile.

Products. In the northern part of the state the chief crops are timothy and grain, with a limited acreage in fruit and potatoes. In the north-central part in the Palouse and Camas prairie regions small grain is the principal crop, with the addition of timothy in the Camas Prairie region. The Palouse country of Idaho, Washington and Oregon is one of the greatest wheat regions of the United States. The dry farm lands of southern Idaho grow large areas of winter grain; the irrigated lands, small grain, sugar beets, potatoes, alfalfa, vegetables and fruit. Idaho has over 120,000 acres in fruit. Lewiston and Emmett are well-known grape regions, Payette is a great prune district, and many regions in northern, central and southern Idaho grow especially fine apples.

The mountain sections afford unexcelled pasture grounds for live stock and here are found large herds of cattle and horses and flocks of sheep. The alfalfa of the irrigated valleys is encouraging the fattening of cattle and sheep and raising of hogs, and is aiding the rapid development of the dairy industry in southern Idaho.

MANUFACTURES. The streams furnish abundant power. It is estimated that Shoshone Falls alone can furnish enough power to run all the railroads and electric lines and provide electricity for lighting and heating purposes for the entire southeastern part of the state. Owing to these conditions and the demands of the local markets, manufacturing industries are multiplying at a rapid rate. Lumbering is the leading manufacturing industry. Next in importance is the manufacture of flour and gristmill products. The production of malt liquors, making brick and cement, the manufacture of beet sugar and canning fruits and vegetables are other important industries.

TRANSPORTATION AND COMMERCE. The Great Northern Railway crosses the extreme northern county of the state diagonally. The Spokane International Railway also crosses this northern portion, connecting Spokane and northern Idaho with the Canadian Pacific Railway at Eastport across the north Idaho line. The Northern Pacific main line crosses north Idaho, and it has a number of branch lines connecting most of the trade centers of north Idaho with each other. The main line of the Chicago, Milwaukee & Puget Sound Railway crosses north Idaho below the main lines of the roads already named, from Roland to Plummer. The main line of the Oregon Short Line crosses the state from the Wyoming line, running from Granger, Wyo., to Huntington, Ore. A branch line running from Salt Lake, Utah, to Butte, Mont., crosses southeastern Idaho through Pocatello, Blackfoot and Idaho Falls, and extends north across to the Montana terminus. The Oregon Short Line has many branches in south Idaho reaching important farming and mining centers. The Payette Valley, the Pittsburg & Gillmore, the Idaho Northern and the Pacific & Idaho Northern railroads are short lines connecting several trade centers with Oregon Short Line shipping points. There are interurban lines connecting the cities of Moscow, Cœur d'Alene and intermediate points with Spokane, and others connecting Boise with Caldwell, Nampa and intermediate points.

The commerce of the state consists of the shipment of gold, silver, lead and other mineral products, wool and live stock, lumber, fruit, grain, hay and potatoes, and the importation of manufactured goods, farm machinery and such foodstuffs as are not raised within the state.

GOVERNMENT. The executive department consists of a governor, lieutenant-governor, secretary of state, auditor, treasurer, attorney-general and superintendent of public instruction, all elected for a term of two years. The Legislature consists of a Senate of not more than 24 members and a House of Representatives of not more than 60 members, the members of both houses being

chosen for two years. The sessions are biennial and practically limited to 60 days. The judicial department consists of a Supreme Court of three judges elected by the people for six years; a District Court in each judicial district; and Probate Courts and justice courts.

EDUCATION. Idaho has an excellent system of public schools, under the general direction of a superintendent of public instruction. The schools of each county are in charge of a county superintendent. The state university at Moscow is at the head of the educational system. State normal schools are maintained at Lewiston and Albion. The Inter Mountain Institute is at Weiser. There are also a number of secondary schools supported by religious denominations. In regions of Idaho where the population will justify, the consolidated system of rural schools is in successful practice. The rural agricultural high school is also being established.

STATE INSTITUTIONS. The hospitals for the insane are at Blackfoot and Orofino, the soldiers' home near Boise. The penitentiary is at Boise, the school for the deaf and blind is at Gooding and the industrial and reform school for juvenile offenders is at St. Anthony.

CITIES. The chief cities are Boise, the capital; Pocatello, Idaho Falls, Moscow, Lewiston, Twin Falls, Cour d' Alene.

HISTORY. Idaho is a Shoshone name which refers to the brilliant sunlight on the state's mountain peaks. The land was first visited by whites when Lewis and Clark (1805-1806) made their explorations. In 1852 gold was discovered. In 1862 the finding of precious metals caused Fort Boise to become a flourishing town. Idaho City and Lewiston being shortly established, Idaho was made a territory in 1863. It then comprised most of Wyoming and Montana, and it was several years before it was cut down to its present dimensions.

Of late years the attention of Idaho has been engrossed with the development of its rich resources. From having had no white inhabitants in 1860, it had 32,000 in 1880. On July 3, 1890, it entered the Union. The state is rapidly increasing in population and wealth.

GOVERNORS. George L. Shoup, 1890; Norman B. Wiley, 1890-1892; William J. McConnell, 1893-1897; Frank Steunenberg, 1897-1901; Frank W. Hunt, 1901-1903; John T. Morrison, 1903-1905; Frank R. Gooding, 1905-1909; James H. Brady, 1909-1911; James H. Hawley, 1911-1913; John M. Haines, 1913-1915; Moses Alexander, 1915-1917; D. W. Davis, 1917—.

Idaho, University of, at Moscow (1889). The University of Idaho was opened in 1892. It offers the usual courses in arts and science and maintains schools of agriculture and applied science, and a department of music. It receives Federal and state support, and has an endowment of 286,000 acres of land. In 1910 it reported about 25,000 volumes in its library. It has more than 500 students.

Ide'alism (from Greek *idein,* to see), a term used in many ways. Its essential characteristic is that it interprets reality as having a meaning or idea apart from sense-appearance, or in addition thereto. In this inner significance is found the ultimate truth of the subject under consideration. In philosophy, idealism is the doctrine that all reality is essentially psychical and has no existence apart from consciousness. It may merely affirm the dominance of the ideal element in reality (Plato, Aristotle); or it may assert that the intrinsic nature and essence of reality is consciousness or reason (Hegel). Idealism does not necessarily deny the existence of external reality, but regards it as containing the same elements of reason and purpose that are present in the mind of the individual. Many idealists claim that this involves the existence of an all-embracing consciousness or Absolute Mind as the ultimate reality of the universe. Idealism is the antithesis of realism and materialism. Natural science is primarily concerned with the study of practical phenomena, as they appear in the world of nature, and its attitude toward these is necessarily realistic. It is different

with philosophy and religion, which are seeking the ultimate nature of things; hence the conflict often existing between science on the one hand, and philosophy and religion on the other.

In literature and art, idealism is not satisfied with mechanical relationships, but regards nature and life as ultimately rational and purposeful. It attempts so to interpret reality as to make these characteristics apparent. Imagination and spiritual value-judgments therefore find a large place in idealism, which nevertheless defeats its own purpose if it is untrue to the real. See PHILOSOPHY; REALISM.

Ide'as, Association of, the linking together of ideas, by the mind, in such close relationship that the thought of one recalls the other. The physiological basis of association is that when certain brain cells have once acted together, a connection is formed between them such that the activity of one is transmitted to the other and the two will again act together. The chances of such connection rather than any other depends upon the frequency of these cells acting together, the lateness of their connection, the intensity of stimulus in their first working together, the scarcity of other connections and the general condition of the brain at the time of receiving the impulse. The mental element of association is very similar. When two ideas have been experienced together, the reappearance of one tends to bring the other with it, depending, as before, upon the frequency of their association, the lateness of their connection, the intensity of the stimulation and the interest in the subject.

LAWS OF ASSOCIATION. The laws of association are four in number: association by contiguity, by succession, by similarity, and by contrast. The first two depend upon the association at the time the connection was formed; the last two depend upon the connection at the time of the recall. Association by contiguity refers to a relation established because two objects were perceived at the same time; thus the odor of a certain flower recalls a certain person who wore it or an event at which these flowers were used. Association by similarity and association by contrast are much alike. The sight of a stranger recalls a friend whom he resembles and a hot day reminds us of the pleasures of a winter day. Association by contrast is primarily a modified association by similarity, since the two have some point of likeness.

The establishment of right associations in youth is important, since, though the memory may be good, it acts through association, and, in the effort of recalling, association is the whole foundation. Association should be direct as far as possible, that is, by objects themselves rather than by pictures; the word method of teaching reading is the product of the psychological knowledge that association should be both as direct and as simple as possible. Punishments and rewards to be of value should also be given with care. A punishment which follows an act at one time but which does not follow it at another is not closely associated with the act and so loses its value, just as the lesson would be lost upon us if we sometimes burned our hands upon the hot stove and sometimes did not. Our various homemade systems of recalling different things to our minds are common examples of associations which have an element of intellectuality. The pain following the touching of the stove gave us an association through the senses which needed no further links to connect it with the act, but when we connect the telephone number of a friend with the date of a battle, or the letter we are to mail with the string on our finger, we have established a connection as an aid where our senses might have failed us.

Idol'atry, the worship of an image which is looked upon as having in itself a supernatural or divine element. Idols may be "graven images" representing some person or deity, or they may be natural objects to which supernatural powers are attributed, as animals. Among the Hebrews, idolatry was considered to be one of the worst forms of sin by which the people were cor-

rupted. More primitive peoples, however, unable to grasp the idea of worshiping an unseen God, or to formulate abstract principles of religion, used idols to express their inborn, though undeveloped, religious sense.

Ignatius, *Ig na' shi us,* **Saint.** See LOYO'LA, SAINT IGNATIUS OF.

Ignis Fatuus, *Ig' nis Fat' u us,* or **Foolish Fire,** a luminous appearance sometimes seen floating over marshy places at night. It may be due to some gas or gaseous mixture capable of very slow combustion or to phosphorescence, but it has not yet been satisfactorily explained. Other names of the same appearance are Will-o'-the-Wisp and Jack-o'-lantern.

Iguana, *Ig wah' na,* a name applied to a large family of tropical American lizards, the largest and most powerful of the family. They are generally known by their high bodies, strong, flattened tails and comblike pouch at the throat. The males bear spines upon the head and back, but these are only rudimentary in the females. Some species of iguanas are edible. Their homes are on the ground or on trees and their food consists of insects and juicy herbs. See LIZARD.

Iguanodon, *Ig wan' o don,* an extinct lizard, the fossil remains of which occur in the Jurassic and Lower Cretaceous rocks of Europe. It was from 15 to 25 ft. in length; the head was narrow and long; and the jaws heavy and furnished with strong, horny anterior beaks and numerous teeth. A large spinal bone, which rose in a ridge, extended from the head to the tail; the pelvic bones strongly resembled those of birds. The forelegs, which had four toes, were much shorter than the three-toed hind legs. The animal lived in trees, on the ground and in water, and fed upon vegetable foods. On the ground it walked on its hind legs and used its tail in a manner similar to that of the kangaroo. Remains of the iguanodon have not been found in America, but the animal is represented by similar existing genera, notably the iguana, which includes the species popularly known as chameleons and horned toads.

Ik Marvel. See MITCHELL, DONALD GRANT.

Il'iad, a celebrated Greek epic consisting of 24 books. The authorship of the poem is a matter of dispute, but it is generally ascribed to Homer, who lived about 1000 B. C. The *Iliad* represents the gradual accumulations of singers for generations. Pisistratus, tyrant of Athens, is said to have first arranged the *Iliad* in the form in which it now exists. The action of the poem is confined to the last year of the siege of Troy, so that some knowledge of the events connected with the Trojan War is necessary to one who reads it. The *Iliad* and Homer's other great epic, the *Odyssey,* were looked upon by the Greeks as the authority in all matters of religious doctrine and early history. These poems exhibit in a remarkable way the varied powers of their author. In his descriptions, his portrayal of human character or his narration of incident, he is always a great master. With all their sublimity of language and conception the *Iliad* and *Odyssey* have a simplicity and tenderness that make them poems of humanity rather than of one race or time. See HOMER; TROJAN WAR; ACHILLES.

Illinois, *Il" i noi',* THE PRAIRIE STATE, one of the East Central States, is bounded on the n. by Wisconsin, on the e. by Lake Michigan and Indiana, on the s. by Kentucky, from which it is separated by the Ohio River, and on the w. by Missouri and Iowa, from which it is separated by the Mississippi River. The Wabash River forms about one-half of the eastern boundary.

SIZE. The extreme length from north to south is 385 m. The greatest breadth is 218 m. and the area is 56,665 sq. m., of which 622 sq. m. are water. Illinois is almost the exact size of Iowa or Wisconsin, a little more than one-half the size of Nevada, about the size of England and Wales and the 23rd state in area.

POPULATION. In 1920 the population was 6,485,280. From 1910 to 1920 there

was a gain in population of 846,689, or 15 per cent. There are 115.7 inhabitants to the square mile, and the state is third in population, being exceeded only by New York and Pennsylvania. Nearly one-half of the population is in and around Chicago in Cook County.

Surface. With the exception of the extreme southern part, Illinois lies wholly in the prairie region. Its surface as a whole is a great plain sloping gently toward the south. In the northern tier of counties there is a range of low hills culminating in Charles Mound, 1257 ft. high, which is the highest point in the state. Along the Mississippi, Rock and Illinois rivers there are occasional high bluffs and in the northern part of the state the surface is rolling. In the central and southern parts, however, it is nearly level. The extreme southern part of the state is crossed by a spur of the Ozark Mountains and is broken and hilly. The highest elevation among these hills is 1047 ft.

Rivers and Lakes. Illinois contains over 275 streams, but most of them are small. The drainage is divided between two river systems, the Mississippi with the Illinois, and the Ohio with the Wabash. The Rock River drains the northwestern part of the state and the northeast is drained by the Kankakee and the Des Plaines, which unite to form the Illinois. This is the most important stream wholly within the state, and its basin includes nearly three-fourths of the surface. The Illinois has become one of the leading fish-producing streams in the country. The fishing industry has its center at Havana. The chief tributaries of the Illinois are the Fox, the Vermilion, the Spoon, the Mackinaw and the Sangamon. The Kaskaskia drains the south-central part of the state directly into the Mississippi. The Little Wabash and the Embarrass drain the southeastern part into the Wabash, thence into the Ohio.

Illinois has no large lakes, but in the northern part of the state are a number of small lakes noted for their beauty, which are popular summer resorts. Fox Lake is the most important.

Scenery. Illinois has no towering mountains, deep valleys or high waterfalls, but the state is noted for its beautiful prairies, which are everywhere in a high state of cultivation. The river valleys are terraced and in some places have high bluffs. The Valley of the Illinois is of special interest because in a former geological age it was through this valley that the waters of the Great Lakes found their outlet to the sea. Starved Rock in La Salle County, one of the highest bluffs in the state, rises perpendicularly 125 ft. above the water in the river. In Randolph and St. Clair counties are interesting caves, and at Piasa and at Grand Tower on the Mississippi are peculiar and interesting rock formations.

Climate. Illinois extends through 5½° of latitude and there is a marked difference between the climate in its northern and southern extremities. The temperature of the southern counties averages about 11° higher than that of the northern. The climate of the state as a whole is mild temperate, but the entire state is subject to sudden changes in temperature. Extremes of heat and cold, however, are of short duration. In the southern half but little snow falls and it remains but a short time. The average rainfall is 38 inches, somewhat heavier in the south than in the north. Throughout the state the climate is healthful.

Minerals and Mining. The area of the coal fields of Illinois exceeds three-fourths the area of the state. The coal lands are south of a line drawn from Rock Island to the northern boundary of Grundy County and east of a line drawn from Henderson County to the southern part of Jackson County. Some of the veins in these fields are over 15 ft. thick and the supply of coal seems inexhaustible. Williamson, Macoupin, St. Clair, Sangamon and Vermilion are the great coal-producing counties. The best coal and thickest seams are just north of the Ozark Ridge. Illinois is one of the leading coal-producing states in the Union.

Oil fields 80 m. long are found along the Wabash River, chiefly in Crawford and Lawrence counties. Some natural gas is also found in this region. Limestone suitable for building purposes is found in 30 counties, but the quarries in Cook, Kankakee and Will counties are the most valuable. Lead and zinc occur in Jo Daviess County. Cement rock and sand used in making glass are found in the Valley of the Illinois River in La Salle County. Fluor spar is mined extensively in Pope County.

Forest and Lumber. There are some forest areas along the streams, but forests containing merchantable lumber are chiefly in the southern counties, where oak and other hard woods are found. There is some lumbering in this part of the state, the lumber being used chiefly in making crates, fruit baskets and furniture.

Agriculture. The entire state north of a line joining Alton to Terre Haute is covered with deep, fertile soil, making the prairies of this section one of the richest agricultural regions of the world. South of this line, with the exception of a fertile strip some 30 m. wide along the Mississippi, and the productive bottom lands along the streams, the subsoil is a tight clay impervious to water, which makes good crops impossible in unusually wet or dry seasons. The farms generally are larger than in Ohio and Indiana. The greater part of them are tilled by their owners.

Products. Corn is the most important crop and in its production Illinois leads the Union and the world. About 10,000,000 acres are devoted to corn every year and the crop is between 350,000,000 and 400,000,000 bushels, nearly half of which is consumed upon the farms. The other important field crops are oats, wheat, hay and potatoes. Barley and rye are raised to some extent. Apples are raised in large quantities in Clay, Richland, Marion and Wayne counties, and in smaller quantities in other parts of the state. In the southern third of the state peaches, pears, strawberries and other small fruits are raised.

The farms in Cook and Lake counties are largely devoted to supplying the Chicago market with vegetables, poultry, eggs and milk. The dairy industry is important also throughout the northern part of the state and in the region near St. Louis. The cultivation of flowers and ornamental plants and the production of nursery stock are also thriving industries. Douglas, Coles and Moultrie counties in eastern Illinois produce more broom corn than any similar area in the world. Union and Pulaski counties south of the Ozark Ridge grow early vegetables for the Northern markets. Cattle, horses and hogs are raised in large numbers.

Manufactures. Illinois is the first state in the Union in slaughtering and meat packing and in the manufacture of agricultural implements and distilled liquors. It is the third state in the total value of its manufactured products, being exceeded only by Pennsylvania and New York. Abundance of fuel and excellent transportation facilities afforded by Lake Michigan and the many railways of the state have combined to develop the manufacturing industries at a very rapid rate. Nearly three-fourths of the manufacturing interests center in and about Chicago. Among the leading industries aside from those already mentioned are the manufacture of iron and steel and their products, of boots and shoes, of furniture, of pianos and other musical instruments, of soap and fertilizer and of clothing. Printing and publishing are also extensive industries. Chicago ranks next to New York in its publishing interests. At Elgin and Springfield are two of the largest watch factories in the country. Elgin is also an important butter market. In Moline and Canton are extensive works for the manufacture of agricultural implements. Rockford is surpassed only by Grand Rapids, Mich., in the manufacture of furniture. East St. Louis has a variety of manufactures. Quincy is noted for its stoves. The great distilleries were at Peoria and Pekin. At Pullman are the largest factories for the manufacture of

railway cars in the world. There are large glass factories at Alton, Ottawa and Streator. White Hall, Macomb and Monmouth make the best quality of stoneware, sewer pipe and building tile, and Galesburg and Danville have extensive manufactories of paving brick. Cairo has become the greatest lumber market in the state. La Salle leads in the smelting of zinc and the manufacture of cement. Other important manufacturing cities are Joliet, Decatur, De Kalb and Bloomington.

Transportation and Commerce. The transportation facilities of Illinois are not surpassed by those of any other state. Chicago is one of the most important lake ports, and through Lake Michigan, connection is made with all the leading ports on the Great Lakes. Chicago is also the greatest railway center in the United States and in the world (See Chicago). Next to Chicago, East St. Louis, Decatur, Peoria, Bloomington and Springfield are the most important railway centers. There is not a town or a village that is not on a line of railway or within short distance of one.

Electric lines are being extended to form systems. The most important of these extends from East St. Louis to Springfield, Decatur, Champaign and Danville and thence to Indianapolis. Branches extend to Bloomington and Peoria. The Mississippi is navigable the entire length of the state and the Illinois is navigable as far as La Salle. The Hennepin Canal connects the Illinois at a point near Spring Valley with the Mississippi at Rock Island. This is a barge canal used for transporting coal.

The commerce of the state is very extensive. Coal from the Illinois mines is sent to all parts of the West and Northwest. Her agricultural products reach all the leading markets in the country, and corn and packed meat are exported to Europe in large quantities. Her manufactures are also widely distributed. In addition to this, Chicago is the great distributing center of the country for the West and Northwest, and its wholesale trade is next in value to that of New York. From her stockyards are shipped more cattle and sheep than from any other market in the world. Iron ore from the Lake Superior region is brought here for the steel mills of Joliet and South Chicago, and grain from other states is brought here for transshipment.

Government. The present constitution was adopted in 1870. The executive department consists of a governor, lieutenant-governor, secretary of state, auditor, attorney-general and superintendent of public instruction, elected for four years, and a treasurer elected for two years. The treasurer is not eligible for reelection. The superintendent of public instruction is elected two years after the election of the governor. The Legislature consists of a Senate of 51 members elected for four years, and a House of Representatives of 153 members elected for two years. There are three representatives for each senatorial district. The Legislature meets biennially and the sessions are unlimited.

The judicial department comprises a Supreme Court of seven judges chosen for nine years from the seven judicial districts into which the state is divided; Appellate Courts, Circuit Courts and County Courts. In the larger counties are also Probate Courts. Justice courts exist in towns and villages and have jurisdiction over petty cases.

Education. The public schools of the state are under the general supervision of a state superintendent of public instruction. Those of each county are in charge of a county superintendent. Cities and larger towns maintain graded schools which are usually independent of county supervision. The district is the unit of administration, and each school is controlled by a local board. A limited number of rural schools have been consolidated. One or more townships or portions thereof may be organized into a district for maintaining a high school. The state contains more than 70 of these township high schools. State normal schools are maintained at Normal, Carbondale, De Kalb, Charleston

and Macomb. The University of Illinois, including the state agricultural college, is at Urbana. The annual expenditures for the schools exceeds $36,000,000.

There are over 40 seminaries and colleges within the state, the most important being: the University of Chicago; Northwestern University at Evanston and Chicago; Armour Institute at Chicago; Lake Forest University at Lake Forest; McKendree College at Lebanon; Illinois College at Jacksonville; Wesleyan University at Bloomington; Knox College at Galesburg; Augustana College at Rock Island; Monticello Seminary at Godfrey; and Rockford College (for women) at Rockford.

State Institutions. The hospitals for the insane are at Kankakee, Elgin, Bartonville, Watertown, Jacksonville and Anna. The schools for the deaf and the blind are at Jacksonville and the institute for the feeble-minded is at Lincoln. The soldiers' and sailors' home is at Quincy, the soldiers' widows' home is at Wilmington and the soldiers' orphans' home is at Normal. There is a United States soldiers' home at Danville. The state penitentiaries are at Joliet and Chester, the state reformatory is at Pontiac, the state homes for delinquent boys and girls at St. Charles and Geneva.

Cities. The chief cities are Springfield, the capital; Chicago, Peoria, East St. Louis, Joliet, Aurora, Quincy, Rockford, Decatur, Bloomington, Elgin, Rock Island, Moline, Freeport, Danville, Galesburg, Cairo and Evanston.

History. Illinois was named from the Indians who lived on the bank of its principal river, also called, from them, the Illinois. Marquette and Joliet sailed up the Illinois in 1673. La Salle built Ft. Crèvecœur at Peoria Lake in 1680 and Fort St. Louis on the Illinois in 1682. Kaskaskia was settled in 1695. The territory was surrendered to the British in 1763. George Rogers Clark of Virginia independently captured the British forts along the Mississippi and at Vincennes, Ind., in 1778-1779. Illinois was given to the United States by the Treaty of Paris, 1783, and was included in the Northwest Territory in 1787. It became a separate territory with a capital at Kaskaskia in 1809, and was admitted to the Union in 1818.

After the insurrection under "Black Hawk," 1832, the Indians left the state. The Illinois and Michigan Canal was finished in 1848. The first railroad in the state was built in 1850. It ran from Chicago to Elgin. Illinois, which sent nearly 250,000 men to the Federal army during the Civil War, was the scene of the Lincoln-Douglas debates (1858). In 1871 occurred the Chicago fire; in 1887 anarchist riots; in 1893, at Chicago, the World's Columbian Exposition. In 1913 women were granted the right to vote for certain specified offices.

Besides three constitutions adopted respectively in 1818, 1848 and 1870, Illinois has had three capitals, Kaskaskia, Vandalia and Springfield. Consult Mather's *The Making of Illinois*; Smith's *Student's History of Illinois.*

Governors. Shadrach Bond, 1818-1822; Edward Coles, 1822-1826; Ninian Edwards, 1826-1830; John Reynolds, 1830-1834; Wm. L. D. Ewing, 1834; Joseph Duncan, 1834-1838; Thomas Carlin, 1838-1842; Thomas Ford, 1842-1846; Augustus C. French, 1846-1853; Joel A. Matteson, 1853-1857; William H. Bissell, 1857-1860; John Wood, 1860-1861; Richard Yates, 1861-1865; Richard J. Oglesby, 1865-1869; John M. Palmer, 1869-1873; Richard J. Oglesby, 1873; John L. Beveridge, 1873-1877; Shelby M. Cullom, 1877-1883; John M. Hamilton, 1883-1885; Richard J. Oglesby, 1885-1889; Joseph W. Fifer, 1889-1893; John P. Altgeld, 1893-1897; John R. Tanner, 1897-1901; Richard Yates, 1901-1905; Charles S. Deneen, 1905-1913; Edward F. Dunne, 1913-1917; Frank O. Lowden, 1917-1921, and Len Small, 1921—.

Illinois, or **Illini,** a federation of Indian tribes of the Algonquian family, once occupying the land now included in the states of Illinois, Iowa, Michigan and Missouri. Among these tribes were the Kaskaskians, Michigamis, Peorians and Cahokias. These Indians were consist-

ently friendly with the French during the French and Indian Wars, and were later, with difficulty, reconciled to the advance of the settlers. Less than 200 of the Illinois Indians now remain in the United States, and these are chiefly on the reservations west of the Mississippi.

Illinois and Michigan Canal, a canal which connects Lake Michigan, at Chicago, with the Illinois River, at La Salle, Ill. It is 6 ft. deep, 60 ft. wide at the bottom and 96 m. long. There are 17 locks. Begun in 1836, this canal was completed in 1848, at a cost of more than $6,000,000. Later, the construction of a network of railways made it of less importance, and it is now little used.

Illinois and Mississippi Canal, also known as the Hennepin Canal, a canal 7 ft. deep, 80 ft. wide and 50 m. long, connecting the Illinois River near Hennepin and Spring Valley, Ill., with the Rock River, 27 m. above its confluence with the Mississippi at Rock Island, Ill. This is the only boat canal constructed in the United States since 1850. It was completed in 1907, cost about $7,250,000, and is used principally for the transportation of coal from the Illinois fields. In connection with the Illinois and Michigan Canal, however, it affords a short route for light boats going from Lake Michigan to the upper Mississippi.

Illinois River, a river of the state whose name it bears. It is formed in Grundy County by the union of the Des Plaines and Kankakee rivers, and flows in a southwesterly direction until it joins the Mississippi 18 m. north of Alton. It is navigable for its entire extent, about 350 m. The Illinois and Michigan Canal connects it with the Chicago River and so with Lake Michigan, and the Chicago Drainage Canal also enters it through the Des Plaines. The chief tributaries of the Illinois are the Fox and the Sangamon, and the principal towns on its banks are Peoria, Ottawa and La Salle. See CHICAGO DRAINAGE CANAL; ILLINOIS AND MICHIGAN CANAL.

Illinois, University of, at Urbana (1867). The university campus lies partly in Champaign and partly in Urbana. This, with the adjacent experimental farm, comprises 610 acres. Opened in 1868, as the Illinois Industrial University, it took its present name in 1885. It includes colleges of literature and arts, agriculture, science, engineering and law, a graduate school, and schools of library science, music and education. The colleges of medicine and dentistry and a school of pharmacy are located in Chicago. Connected with the university, and at Urbana, are agricultural and engineering experiment stations, maintained by the Federal Government, also the state geological and water surveys and the office of the state entomologist. The university has many fine buildings, valuable collections and a library of about 175,000 volumes. Its total annual receipts exceed $3,000,000. It enrolls about 5000 students.

Illit'eracy, the inability of a person to read and write. Compulsory education diminishes the percentage of illiterates in a country; hence it is a fair test to judge the education, if not the intelligence, of a community, by the number of illiterates found therein. In Germany, Switzerland, Sweden and Norway the rate is low; in Spain, Portugal and the southern European countries there is a high percentage, and in the United States the percentage varies for different states, but for the country as a whole it is 7.7. In the other large countries it varies as follows:

Germany	0.11	Canada	10.20
Sweden	0.11	Belgium	12.80
Switzerland	0.30	Austria	23.80
Scotland	3.57	Italy	38.30
Holland	4.00	Russia	61.70
France	4.90	Spain	68.10
England	5.80	Portugal	79.00

Illyricum, *Il lir' i kum,* the name of the Roman possessions of varying boundaries, but including the western region of the Balkan Peninsula, known as Illyria. Southern Illyria came under Roman power about 168 B. C., and later the entire country was subjugated. In the time of Constantine the name applied to nearly all of the Roman ter-

ritory east of the Adriatic, including most of the modern divisions of Bosnia-Herzegovina, Dalmatia, Croatia, Montenegro and Albania. The boundaries of this prefecture at one time extended until they included within their limits the cities of Athens and Vienna. The name Illyricum gradually ceased to have political significance as the Slavic people began to settle the Balkan Peninsula; the Albanians are held to be the descendants of the Illyrians subjected by Rome, but sufficiently separated from the tide of immigration to maintain a distinct nationality. Illyria is the scene of Shakespeare's *Twelfth Night.*

Im'age. See LIGHT; LENS; MIRROR.

Imag"ina'tion, the mental power by which new thoughts are brought into play. A vivid imagination left to its own guidance is apt to become uncertain and harmful; rightly restrained, it is a valuable power that becomes one of the richest products of the mental life.

An imagination may be creative, like that of the poet and artist; or receptive, like that of the person to whom the poem or picture makes appeal. It is passive when the combining of ideas to form new products is unconscious, like that of the child who sees the fairies in the trees; or active, when the combination is intentional. The distinction between these two is, however, not definitely marked. In its use the imagination is termed scientific when its aim is purely intellectual; inventive, when its aim is utility and its purpose mechanical construction; artistic, when its purpose is art and its aim beauty.

Lack of imagination is generally due to repression and not to natural tendencies. Imaginative literature, fairy tales and legends, which were once seriously condemned, are now being once again welcomed on account of the service they do in cultivating an imagination which, later in life, accomplishes the inventions of the practical world of science and art.

Im"migra'tion, the entrance into a country of settlers from a foreign land. Leaving the country for the purpose of residence is emigration; hence immigration and emigration denote simply direction to and from. Immigration may arise from political, economic or religious conditions, or from mere love of adventure. The economic gain of immigration to new countries is evident. It adds directly to their available labor force, that is, to the number of adults engaged in the work of producing wealth. Immigration to the United States far exceeds that to any other country.

The immigration law of the United States, as revised by the Fifty-ninth Congress, provides for a poll tax of $4 for every alien entering the United States. The money thus collected goes into the treasury and constitutes a permanent appropriation for defraying the expenses of regulating immigration. The following classes are excluded from admission into the United States: all imbeciles, criminals, paupers, the insane and persons unable to support themselves. By the acts of 1882 and 1893 such persons are rejected and the steamship companies that bring them are compelled to take them back, the law clearly stating that all such aliens as become public charges from causes existing prior to their landing shall be deported at any time within three years after their arrival. Canada, the South American countries and Australia have also received a large immigration. See UNITED STATES, subhead *Immigration.* Consult Hall, *Immigration* (New York, 1906).

Immortelle, *Im" or tel',* a common woodland herb of the Composite Family, known from New Jersey west to the Mississippi and north. The stems are erect and rise from one to two feet high, bearing dusty, narrow leaves. The clustered blossoms are of two kinds, fertile, or fruit-producing, at the outside and sterile in the center. The separate heads are circled with a number of dry chafflike appendages, white or yellowish-white in color. Immortelle is a familiar feature of dry autumn woods, where its heads of blossoms seem never to droop but to be, as the name implies, everlasting.

Impeach'ment, an accusation presented in legal form, imputing improper conduct on the part of a civil officer of the government and calling him to a defense before the proper tribunal. In the United States the House of Representatives has the sole power of impeachment and the Senate the sole power to try all impeachments. As a precaution against the use of impeachment for party purposes a two-thirds vote is required for conviction, and in such case the judgment cannot extend further than "to removal from office and disqualification to hold and enjoy any office of honor, trust or profit under the United States." The whole procedure is conducted solely to the end that the public service may be relieved of dishonest officials. The ordinary machinery of the law may later be employed to bring to justice any one removed from office by such proceedings.

Should the president be impeached the chief justice of the Supreme Court must preside. In states of the Union the proceeding is practically the same as in the United States Government service. The House of Representatives brings the charges and the Senate tries the accused. When the governor is under impeachment the chief justice of the State Supreme Court presides at the inquiry. Only seven times in our history have articles of impeachment been voted by the United States House of Representatives. These cases are:

(1) William Blount, United States senator from Tennessee, in 1797 was impeached for conspiring with British officers to steal Louisiana for the benefit of England; he was expelled from the Senate. (2) Judge Pickering, of the United States District Court of New Hampshire, was impeached in 1833 for drunkenness and profanity while on the bench; he was removed from office. (3) Samuel Chase, a justice of the Supreme Court of the United States, was impeached in 1804 for "highly indecent and extra-judicial reflections on the United States Government" in a charge to a grand jury; he was acquitted. (4) Judge West H. Humphries, of the United States District Court of Tennessee, suffered impeachment in 1862 for joining the Confederacy without previously resigning his office; his office was declared vacant. (5) President Andrew Johnson was impeached in 1868, charged with violating the Tenure of Office Act; he was acquitted. (6) William W. Belknap, secretary of war in President Grant's cabinet, was impeached in 1876, for corruption in office. He resigned. The trial proceeded, but he was acquitted. (7) Judge Robert W. Archbald, of the Federal Court of Commerce, was impeached in 1912 for sustaining improper business relations with coal and railway corporations which had cases pending before his court. He was convicted early in 1913, his sentence being removal from office and disqualification from holding further office under the United States.

Imperialism, a political term applied to the policy of a government toward the expansion of national control over geographical area greater than that within national boundaries. The policy, when logically carried out, results in the establishment or maintenance of colonies or dependencies. Each acquisition, or attempted acquisition, of new territory by the United States has met with much opposition, which was particularly pronounced at the close of the Spanish-American War. The term *imperialism* was employed as a "catchword" in the presidential campaign of 1900, especially with regard to the purchase of the Philippines and the retention of Porto Rico. The Supreme Court decided, however, on Dec. 2, 1901, on the constitutionality of expansion; and that extension of the sovereignty of the United States to new territory guarantees liberty, the right to property and the protection of the United States to the people.

Impres'sionist, or Naturalist, School of Painting. See PAINTING, subhead *The Nineteenth Century.*

Imprisonment, *Im priz' 'n ment,* in the strictest sense of the term, the legal confinement of a person in a jail or prison provided by law for the purpose. In its

broadest sense imprisonment means the restraint of one's personal liberty, whether or not he is forcibly detained within an inclosure. A person becomes a prisoner at the touch or command of an officer legally qualified to make arrests. Imprisonment is the punishment most commonly inflicted by courts for crime, the term depending upon the nature of the crime. The sentence varies from a few days, or even hours, to life. Persons under indictment for crime are frequently imprisoned to hold them for trial. Indicted persons can usually be released on bail. Persons wanted for witnesses at a trial are sometimes imprisoned to assure the court of their presence when needed. False imprisonment consists of illegally detaining one, and the person so detained can bring action for damages.

Im'pulse, a tendency to activity which comes without the prompting of a definite reasoning. The impulses have been grouped in three classes: sensation impulses, those which cause us to fan ourselves to relieve heat, or to rub our hands for warmth; perception impulses, those which cause us to look up when we see others looking up; and imagination impulses, those which cause us to dodge a threatened blow, or to do a generous deed. An impulsive action is apt to be the result of three kinds of impulses successively aroused; for instance, the simple act of going into a restaurant for lunch began with the sensation of hunger which stopped our reading; the imagination of satisfying the hunger led us to rise; and the sight of others entering a certain restaurant caused us to follow.

Many impulses are never analyzed nor considered at all peculiar because they are common to all people, as the impulse to put food into the mouth when the body is hungry. Other impulses, however, which everyone has in some form, if carried to any extent, amount to mania, as the impulse to jump from a lofty building, to break fragile articles and to step over cracks in the walk. The restraining of these impulses is self-control and results in a strength of character not attained by those who always give way to their impulses.

Inca, *In' ka,* one of the leading tribes of South America, who formerly inhabited the region comprising Peru, Ecuador and the northwestern part of Bolivia. They were the most advanced in civilization of any of the South American tribes. They had a well-organized government which was systematically and justly administered. They constructed extensive irrigation works and built large granaries. They had a good system of roads, over which posts or public messengers traveled at regular intervals. The Incas possessed large quantities of gold and silver, which they used in decorating their temples and palaces, and many designs in gold and silver at the time of their conquest by the Spaniards gave evidence of the skill of their workmen. Their buildings were also so well constructed that substantial ruins of these still remain. The Incas were conquered by the Spaniards under Francisco Pizarro, 1531-1533, but it required 40 years completely to subdue the inhabitants. Some authorities claim that as workmen in metals and engineers they excelled their conquerors. See PERU, subhead *History;* PIZARRO, FRANCISCO.

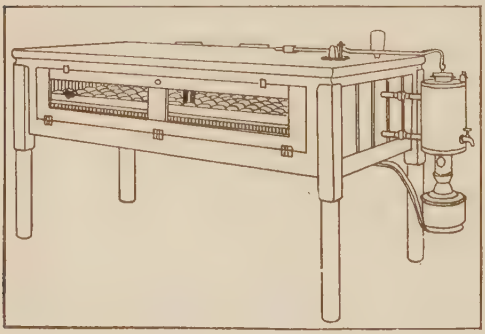
Incense, *In' sens,* a perfume whose odor is developed by burning. The incense used at the present time consists of some resinous base, mingled with sweet-smelling materials, such as olibanum, benzoin, storax and powdered cascarilla bark. These ingredients are placed in a censer so as to fall on hot charcoal, and their odor is then diffused through the building. Both the Greek and Roman Catholic churches use incense in public worship, but it is not generally used among Protestants. In the last 50 years it has been restored to some extent in the Anglican Church. The practice of burning incense was a part of the worship of the sanctuary among the Jews, several allusions being made to it in the Pentateuch. The ancient Egyptians, Assyrians, Babylonians, Hindus, Greeks and Romans used incense in their

worship of the gods, and the Buddhists still make incense-burning a part of their ceremonial.

Inclined' Plane, a simple machine whereby a small force acting through a great distance can do the same work as a much greater force acting through a smaller distance. It is used commonly to raise weights, as when barrels are rolled up an inclined plank instead of being lifted vertically. Neglecting the retarding forces of friction, the general law of equilibrium for the inclined plane is as follows: *To hold an object from sliding, the force that must be applied parallel to the plane is equal to the weight of the object multiplied by the height of the incline and divided by the length of the incline.* If friction is present, as is always the case in practice, a somewhat less force is required to hold the body from sliding or rolling down, and a somewhat greater force is required to move the body up the incline. The winding of a road about a hill in its ascent to make the grade easier is an example of the inclined plane. In all cases, on account of friction, more work must be done when using the inclined plane than when lifting the body directly.

Income Tax. See TAX, subhead *Income Tax.*

In'cuba"tor, a contrivance in which artificial heat is used in hatching eggs. It consists of a chamber in which an



INCUBATOR

even temperature is maintained by means of heated water surrounding it, and in which the eggs to be hatched are placed. It is sometimes warmed directly by a lamp. A good incubator imitates natural conditions as closely as possible by making the air moist, as well as by keeping it at the correct temperature of about 103° F., and providing proper means for ventilation. The eggs should be frequently turned during the first few days, but later on they must not be touched until hatched and the chicks are dried out. Incubators range in size from two dozen to several hundred eggs' capacity. About 20 per cent is the loss from fertile eggs in hatching, but great care and attention are required in operating an incubator and in raising the chickens afterwards. See FOWL, DOMESTIC.

Independ'ence, Kan., a city and the county seat of Montgomery Co., 165 m. s.w. of Kansas City, Mo., on the Verdigris River and on the Missouri Pacific, the Atchison, Topeka & Santa Fe and other railroads. Independence is surrounded by an agricultural district, of which it is a center and distributing point. Its activities involve the operation of flour mills, cotton mills, a window-glass factory, planing mills, vitrified-brick works, paper mills, cracker factories, sugar mills, ironworks and Portland-cement plants. The vicinity abounds in natural gas and oil wells. There is a public library in the town, also a fine courthouse. The city is administered under the commission form of government. Population in 1920, U. S. census, 11,920.

Independence, Mo., a city and the county seat of Jackson Co., 3 m. s. of the Missouri River and about 10 m. e. of Kansas City, on the Chicago & Alton, the Missouri Pacific, the Kansas City Southern and other railroads. Independence is connected with Kansas City by an electric railway and a fine boulevard. It is a stock-breeding center of importance. In connection with the several industrial activities are operated flour and planing mills, scale works and a foundry. Independence has a public library, a courthouse, surrounded by a public square, and is the seat of St. Mary's Academy, under the auspices of the Sisters of Mercy. In the course of

the Civil War two military encounters occurred here, the first, in 1862, between the forces of Colonel Hughes (Confederate) and Lieutenant-Colonel Buel (Federal); the second, in 1864, with General Pleasanton and General Price commanding the Union and Confederate armies respectively. Settled and incorporated in 1827, Independence was chartered as a city in 1889. Population in 1920, U. S. census, 11,686.

Independence Hall, a brick building in Chestnut Street, Philadelphia. It was erected between 1729 and 1734, and the tower was added in 1750. In 1735 it was first used as the Pennsylvania State House, later it was turned into an office building, and during the Revolutionary period it became a meeting place for the Continental Congress. Here Washington became commander-in-chief of the American army in 1775, the Declaration of Independence was adopted on July 4, 1776, and the Constitutional Convention assembled in 1787. The building is now used as a museum for Revolutionary and historical relics.

In'dia, a great peninsula of southern Asia, forming, politically, a vast British possession known as the Empire of India. It is bounded upon the n. by Afghanistan, Chinese Turkestan and Tibet, upon the e. by French Indo-China and Siam, upon the s. by the Indian Ocean and the Bay of Bengal and upon the w. by the Arabian Sea, Persia and Afghanistan. The Hindu Kush, Karakorum and Himalaya mountains form a great natural boundary on the north, while Burma, on the east, and Baluchistan, on the west, politically are parts of India, although not lying within the peninsula. The British Parliament considers India as that part of this region which is directly or indirectly under British rule or protection. British India comprises only those districts under British law and excludes the Native States. In this characterization British India has an area of 1,097,901 sq. m., or about one-third that of the United States; the Native States have an area of 691,253 sq. m., and the total area of India is 1,789,154 sq. m.

PHYSICAL CHARACTERISTICS. The surface of India has widely varied features. The great wall of mountains at the north comprises the highest upon the globe, and the passes through them lie at an elevation of from 17,000 to 20,000 ft. above the level of the sea (See HINDU KUSH MOUNTAINS; KUENLUN MOUNTAINS; HIMALAYA MOUNTAINS). South of these lie the plain of the Ganges and the Desert of Thar, or Indian Desert. The first of these is a level, fertile tract following the course of the great river. This is the most thickly populated region of India. The desert is separated from this at the west by a height of land which forms a watershed between the Indus and the Ganges systems; it is a barren tract extending from the foothills of the Hindu Kush Mountains to the Rann of Cutch, a northeastern indentation of the Arabian Sea. Where the peninsula begins to narrow between the Arabian Sea and the Bay of Bengal, there is a great interior table-land enclosed between the Eastern Ghats on the east coast and the Western Ghats on the west. The Nerbudda River and the Vindhya Mountains form its northern boundary, and the Nilgiri Hills, the southern. The northern part of the table-land is called Dekkan, and extends south to the Kistna, or Krishna River, a tributary of the Bay of Bengal; the southern part is called the Plateau of Mysore. Both have an elevation of from 1400 to 3000 ft. and have numerous isolated peaks rising fully 2000 ft. above the plain. The slope is generally toward the east.

There are many great rivers in this region. The Ganges, with its many tributaries, chief among which is the Jumna, flows across the northern part and through a great delta into the Bay of Bengal. The Brahmaputra joins the Ganges from the northeast. The Irrawaddy and the Salwen are rivers of Burma, while the Indus, with its affluents, the Chenab and the Sutlej, is a river of Baluchistan entering the Arabian Sea. The rivers of the central part extend almost across the peninsula; of these the

Godavari and the Kistna flow east and the Nerbudda flows west. See GANGES; INDUS; BRAHMAPUTRA.

CLIMATE. Like the physical features, the climate of India is greatly diversified. In the north there are both summer and winter rains, and at Cherrapongee, a village in the Brahmaputra Valley, the annual rainfall averages more than 600 inches; this is the wettest region of the globe. On the other hand at Sindh, lying upon both sides of the Indus, there is no rainy season, and sometimes years pass without any rain falling. In central India there is a light rainfall, and at the extreme south showers are frequent. This gives ample reason for the severe famines of some regions of India, while vegetation grows superabundantly in other regions. The temperature varies with the elevation, and ranges from the tropical heat of the coastal plains to the cold of the perpetual snows upon the mountains.

PRODUCTIONS AND INDUSTRIES. The native plants of India are of all types. Scattered blossoming plants of Arctic nature exist on the mountains; farther down the slopes are forests, not so extensive as formerly, but now protected by the government. Teak, sandalwood, blackwood, deodar, cedar and oak are found, especially in the central tracts, while in the subtropical regions the magnolia, rhododendron, camphor and fig are the most common. At the mouths of the rivers and in isolated regions inland occur dense jungles, where wild beasts make their haunts; apes, tigers, leopards, lions, elephants, buffaloes and many birds of exquisite plumage are among those seen. The bamboo is the useful jungle tree and is employed in innumerable ways throughout the country. The cultivated products include: wheat, raised in Punjab and the United Provinces; rice, the staple food of Bengal and Burma; cotton, a product of the central region; opium, a government monopoly, raised chiefly in the Ganges basin near Benares; tea, grown extensively in Assam, lower Bengal, the southern hills and the slopes of the Himalayas; coffee and cinchona, also southern products; and sugar cane, grown throughout the peninsula. Barley, millet, indigo, jute and oil seeds are produced in many regions. The mineral resources include iron, copper, lead, tin, coal, petroleum, salt, precious stones and some gold and silver. Of the exports, which are chiefly cotton, oil seeds, rice, jute, tea, wheat, hides and skins and opium, fully one-half go to Great Britain and China.

Agriculture is by far the leading industry. Each province has a department of land records and a department of agriculture, which collect and disseminate statistics, establish experimental and seed farms and control the agricultural schools and colleges. Manufacturing gives occupation to a comparatively small per cent of the people.

PEOPLE AND LANGUAGE. India is a country inhabited by many races, and at least 25 languages are in use. In the mountains and in the farther recesses of the table-lands live many of the original Indian race, who were driven from their homes in the valleys by incoming peoples. In the jungles are primitive tribes. Along the rivers are people of every nationality, but chiefly of the white race. All of these may be grouped in four well-marked divisions: the non-Aryans, or aborigines; the Aryans; a mixed race developed from the mingling of these two peoples; and the Mohammedan invaders.

From this great mixture of peoples wide differences in civilization and political status have resulted, and the Hindu caste system is an example of its effects. A caste is a class descending, or claiming descent, from the same ancestor, all members of which follow the same calling and belong in the same social group. The laws of caste have been very definite, and marriage or association out of one's own caste is not only prohibited but constitutes an irremediable disgrace.

RELIGION AND EDUCATION. The Hindu religion, or Brahmanism, claims by far the greatest number of followers (See BRAHMANISM). Next in numbers are the Mohammedans. The Animist re-

ligion is the original faith of the aborigines and is still found among many tribes. The Christian religion has about 3,000,000 followers, and the remaining people are Buddhists, Sikhs and Parsees.

Under English rule education has greatly advanced, although India has always been an educated nation. There are at present nearly 131,000 public educational institutions and 40,000 private schools. Among these are the five universities—of Calcutta, Madras, Bombay, Allahabad and Punjab. There are normal schools in every province, several excellent medical schools and technical schools of all kinds. Education, however, is not compulsory and illiteracy is still not uncommon.

LITERATURE. See LITERATURE, subhead *India.*

GOVERNMENT. In 1858 all the territories before governed by the East India Company came under the control of the British sovereign. The secretary of state for India is a member of the cabinet, and he is assisted by a council appointed by him for seven years. At least nine of the members must have lived in India ten years and not have left it over five years before their appointment. The executive authority is vested in a governor-general appointed by the Crown, and his term of office is usually five years. The capital of the empire since 1912 has been Delhi.

For administrative purposes there are ten great provinces and four smaller ones. In the first group are Madras, Bombay, Bengal,, United Provinces, the Punjab, Burma, Berar, Central Provinces, Assam and North-West Frontier Province; in the second, Coorg, Ajmere-Merwara, British Baluchistan and Andaman and Nicobar islands. Though the provinces differ in their form of government, each has subdivisions and districts and each enjoys a degree of independence commensurate with its size. The control of the Native States varies, but each is ruled by a native prince, minister or council under the supervision of a resident agent.

There are 29 cities having a population of more than 100,000. The most important of these are Calcutta, Bombay, Madras, Hyderabad, Rangoon, Lucknow and Delhi.

HISTORY. The Indo-Europeans entered India in prehistoric times. Their sacred books, the Vedas, appeared previous to the Christian Era, and Buddha lived as early as 500 B. C. Alexander the Great, when he invaded India in 326 B. C., found flourishing independent Hindu states. The Mohammedan Empire was established in 1526, and Agra and Delhi attained the magnificence of Bagdad. In 1498 India was reached by way of the Cape of Good Hope, and a new era began. In 1765 many of the territories, including Bengal, were formally ceded to the English East India Company. In 1774 Warren Hastings became the first governor-general. The British Empire took control in 1858, and in 1876 Victoria assumed the title of Empress of India. Baluchistan was added to India at this time, and ten years later Burma was conquered and annexed. Population of provinces, 244,267,542; of Native States, 70,864,995; total, 315,132,537.

India Ink, a kind of black ink made originally in China and Japan, erroneously supposed to have come from India. It is a true black ink without any hue or tinge of color, and is indelible. It is made in China of lampblack or soot, mixed with a little glue or size and camphor and pressed together into cakes. When water is added to India ink, there is formed the ink used by the Chinese in writing, painting and drawing. Europeans and Americans employ a modified variety of India ink in fluid form for drawing and painting. When the ink is made from the dried pigment from cuttlefishes and browned by an alkali, it is known as sepia, and is much used by artists in drawings of landscapes and portraits.

In"dian'a, THE HOOSIER STATE, one of the East North Central States, is bounded on the n. by Lake Michigan and Michigan, on the e. by Ohio, on the s. by Kentucky, from which it is sepa-

rated by the Ohio River, and on the w. by Illinois. The Wabash River forms part of the western boundary, and the boundary line in Lake Michigan is 10 m. north of the most southern point in the lake.

Size. The greatest length from north to south is 277 m. The breadth is 147 m. and the area is 36,354 sq. m., of which 309 sq. m. are water. Indiana is about the size of Maine and Delaware combined, a little more than one-third the size of Wyoming, a little larger than Scotland and the 37th state in area.

Population. In 1920 the population was 2,930,390. From 1910 to 1920 there was a gain in population of 229,514, or 8.5 per cent. There are 81.3 inhabitants to the square mile and the state ranks 11th in population.

Surface. Indiana lies in the great prairie region of the Mississippi Basin and its surface is generally level or slightly rolling. In the northeast corner is a low plateau which in places reaches an altitude of 1200 ft., and in the east-central part is another plateau extending westward to a point near Indianapolis. In its highest point this plateau has an altitude of 1285 ft. Along the Wabash River the surface is a plain with little variation. South of Lake Michigan the land is low and swampy, but when drained, this land is very fertile. Bordering the lake is a row of sandhills, or dunes, which are of great interest to geologists.

South of the Wabash the surface is rolling prairie until the two southern tiers of counties are reached. Here the surface is broken by deep valleys. This is a limestone region and contains numerous caverns. Wyandotte Cave, which is next to Mammoth Cave in size, is celebrated for its beautiful formations (See Wyandotte Cave).

Rivers and Lakes. The Maumee drains the northeastern section and the Kankakee the northwestern. The principal river is the Wabash, which crosses the central part of the state and with its tributary, the White, drains most of the area. The White is formed by the East Fork and the West Fork. The other streams are short and small.

In the northern part of the state there are a number of small lakes which are popular summer resorts. The largest are English, James, Crooked, Turkey, Tippecanoe and Maxinkuckee.

Climate. Indiana has a mild temperate climate. The average temperature for winter is 31° and for summer 76°. The southern part of the state has a warmer climate than the northern, and here in summer the thermometer may occasionally reach 100°, but the periods of excessive heat are of short duration. The average rainfall is 43 inches. The climate is healthful and the state is practically free from drouths and destructive storms.

Minerals and Mining. The coal fields of Indiana are located in the western and central parts of the state and have an area of 7000 sq. m. Bituminous and block coal are mined in large quantities. Block coal is of especial value because it can be used for smelting iron ore without first being made into coke. Over 7,000,000 tons of coal are mined yearly, and the industry gives employment to about 13,000 men.

Natural gas was discovered in the east-central part of the state in 1886. The gas field extends over Hancock, Henry, Hamilton, Tipton, Madison, Grant and Delaware counties. For a time the abundance of gas led to the location of many manufactories in this part of the state, but a portion of the supply has been exhausted. Some wells that have ceased to yield gas when bored deeper yield petroleum. There are oil fields in Adams, Jay, Blackford, Wells and Grant counties. From these fields large quantities of petroleum are obtained. Limestone and sandstone of excellent quality occur in the southern part of the state. Bedford limestone found in Owen, Monroe, Lawrence, Washington and Crawford counties is extensively quarried. Clay suitable for brick and pottery is widely distributed, and cement rock occurs along the Ohio River and in the northern part of the state. The state contains a num-

ber of mineral springs. The French Lick and West Baden springs are widely known for their medicinal properties.

FORESTS AND LUMBER. Formerly the southern part of the state was covered with forests of hard wood, but much of this region has been cleared and brought under cultivation. However, sufficient forests still remain to make lumbering and the manufacture of lumber products one of the leading industries of the state.

AGRICULTURE. Agriculture is by far the most important industry, and furnishes occupation to the largest number of people.

Soil. In the northeastern part of the state the soil is mostly a clay loam, with some level, dark loamy areas and numerous small peaty depressions. There are considerable areas of sandy and of flat and marshy land in the northwestern part of the state, much of which is still too wet for general cultivation, but drainage operations are proceeding rapidly. The Wabash Valley is generally rolling, with a rich loamy soil inclining to be clayey along the eastern side. The southern part of the state, with the exception of the river valleys, is hilly, especially the three southern tiers of counties, and the soil is almost all clayey and often lacking in fertility. The prairie regions of the state are practically confined to the northwestern corner.

Products. The leading field crops are corn, wheat, oats, potatoes and hay; apples, peaches, pears and small fruits are raised all over the state, and the reclaimed swamp lands in the north are largely devoted to garden vegetables for the Chicago market. Large numbers of cattle and sheep are raised in the southern portion of the state, which affords excellent pasture for them. Horses and mules are a source of much income to the state. Dairying is one of the important branches of agriculture, and yields an income of nearly $16,000,000 a year. The income from poultry and eggs nearly equals that from the dairies.

MANUFACTURES. There are important meat-packing plants at Hammond, and slaughtering and meat packing is one of the leading industries. At Gary are the largest steel mills west of Pittsburgh. East Chicago also has steel mills, and the output of iron and steel of all these mills is large. Lumbering and the manufacture of lumber products is the third industry in point of value. The sawmills are small and distributed throughout the forest region, but their combined output is important. The manufacture of cotton and woolen goods and of knit goods, of machinery, of automobiles and of carriages and wagons are also important industries. At South Bend is the largest carriage factory in the world. The manufacture of glass, though still important, has declined with the diminishing supply of natural gas.

TRANSPORTATION AND COMMERCE. The state has about 7000 m. of railway and more than 1000 m. of electric lines. Railways extend in all directions, and with the exception of the two southern tiers of counties the state is amply supplied with railway facilities. Some of the most important systems are the Pennsylvania, the Lake Shore & Michigan Southern, the Big Four, the Grand Trunk, the Wabash and the Baltimore & Ohio. Indianapolis, Fort Wayne, South Bend, Logansport and Lafayette are the chief railway centers. Electric lines have in some localities been combined into systems covering long distances. Indianapolis is the most important center of these systems. The Ohio is the only navigable river. Michigan City, Gary and East Chicago are important lake ports.

The commerce of the state is extensive. Agricultural produce, live stock, iron and steel, carriages, automobiles and other manufactured articles are shipped in large quantities to the great commercial centers, and raw material for manufactures and such foodstuffs and manufactured goods as cannot be produced with profit within the state are imported.

GOVERNMENT. The present constitution was adopted in 1851 and the Australian ballot was adopted in 1889. The executive department consists of a governor, lieutenant-governor, clerk of the Supreme Court, elected for four years,

and other state officers, chosen for two years. The Legislature, known as the General Assembly, consists of a Senate of 50 members elected for four years and a House of Representatives of 100 members elected for two years. Sessions are held biennially. Regular sessions are limited to 60 days and special sessions to 40 days.

The judicial department comprises a Supreme Court of five judges elected by districts for six years; an Appellate Court and Circuit Courts and minor Criminal Courts and County Courts.

There are local legislative bodies in every township and county, that regulate expenditures and the levying of taxes, and there is a uniform system of city government throughout the state.

EDUCATION. Indiana has an excellent system of free public schools. The educational system is under control of a superintendent of public instruction who is elected for two years, and a state board of education appointed by the governor. The township is the unit for administration and the schools in each township are in charge of one trustee. The township trustees of a county elect the county superintendent. There are also county boards of education. Township trustees have power to issue school bonds. Graded schools and high schools are found in all cities and larger towns. There are also central high schools in many of the townships having only rural schools. There is a state normal school at Terre Haute, and the normal schools at Valparaiso, Angola, Marion and Danville are accredited schools, as is also the teachers' college at Indianapolis. Purdue University at Lafayette and the University of Indiana at Bloomington are at the head of the educational system of the state. The state agricultural college and agricultural experiment station at Lafayette are connected with Purdue University.

The leading educational institutions not under control of the state are De Pauw University at Greencastle; Butler College at Indianapolis; Earlham College at Richmond; Franklin College at Franklin; Hanover College at Hanover; Indianapolis University; the University of Notre Dame at Notre Dame; Wabash College at Crawfordsville; Vincennes University; and Rose Polytechnic Institute at Terre Haute.

STATE INSTITUTIONS. The hospitals for the insane are at Indianapolis, Evansville, Logansport and Richmond. The school for the deaf, dumb and blind is at Indianapolis. The state soldiers' home is at Lafayette and the soldiers' orphans' home at Knightstown. The penitentiary is at Michigan City and the state reformatory at Jeffersonville.

CITIES. The chief cities are Indianapolis, the capital; Evansville, Fort Wayne, Terre Haute, South Bend, Muncie, New Albany, Anderson and Richmond.

HISTORY. Indiana is connected with a most interesting period of American history. The French explorer, La Salle, explored its northern borders as early as 1680, and French voyageurs, coming into the state by way of the Maumee Portage, worked their way up and down its rivers; Vincennes was an outpost station of France founded in 1724. It remained French territory until the Treaty of Paris in 1763 transferred it to Great Britain. During the Revolutionary War it was taken by General Clark as a part of his notable activities that secured for the United States that vast and fertile Northwest Territory lying west and north of the Ohio River to the head waters of the Mississippi. Indiana was the second state carved from that territory in accordance with the Ordinance of 1787, coming into the Union as a free state in 1816. (See Northwest Territory).

While yet a part of that territory, and thus on our western frontier, it was the scene of the great Indian battle of Tippecanoe in 1811. The early settlers reached Indiana by way of the Ohio River and the Cumberland Road and thus the southern part of the state was the first settled. After its admission to the Union the state entered on an era of quiet development characteristic of Indiana.